M/027/0006
Task# 2665
cc Tom
Leslie
Paul

Graymont Western U.S., Inc.
Cricket Mountain Project, Utah

Notice of Intention to Revise Mining Operations
Big Sage

GRAYMONT

Graymont Western, U.S., Inc.
3950 South 700 East
Suite 301
Salt Lake City, Utah 84107

Prepared by:

SRK Consulting
Engineers and Scientists

SRK Consulting (U.S.), Inc.
1250 Lamoille Highway, Suite 520
Elko, Nevada 89801

Revised September 2008
Revised December 2007
Revised May 2007
SRK Project No. 138406

0005

September 26, 2008

Ms. Dana Dean
Department of Natural Resources
Division of Oil, Gas, and Mining
Associate Director of Mining
1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, UT 84114-5801

Re: Response to Review of Amended Notice of Intention to Commence Large Mining Operations, Graymont Western US, Inc. (Graymont), Big Sage, M/027/006, Task ID# 1826, Millard County, Utah.

Dear Ms. Dean:

Graymont Western US, Inc. is submitting the following responses to a review made by the Division of Oil, Gas, and Mining (DOGM) concerning Graymont's Amended Notice of Intention (NOI) for Big Sage:

R647-4-104 - Operators, Surface and Mineral Ownership

Please provide the following information:

1. **The name, permanent mailing address, and telephone number of the surface landowner(s) and mineral owner(s) of all land to be affected by the operations.**

   Graymont Western U.S., Inc.
   3950 South 700 East
   Suite 301
   Salt Lake City, Utah 84107
   Contact: Michael R. Brown
   Phone: (801) 264-6880
   Fax: (801) 264-6874

   The following information has been added to section 1.4:

   State of Utah
   School and Institutional Trust Lands Administration
   675 East 500 South, Suite 500
   Salt Lake City, UT 84102
   Phone: (801) 538-5100

2. **The federal mining claim number(s), lease number(s), or permit number(s) of any mining claims, or federal or state leases or permits included in the lands affected. (TM)**

   The state lease number is ML 35572.

R647-4-105 - Maps, Drawings & Photographs

105.2 Based on submitted maps, the Division assumes the permit area is equal to the bonded area. (BE)

The Permit Area and the bonded area are equivalent. However, only an estimated 33% of the buffer zones around the quarry areas and the overburden/fines piles are anticipated to be disturbed. As such, the surety calculation only includes reclamation costs for 33% of the buffer zones. If more disturbance is planned in within the buffer zones, Graymont will increase the surety as appropriate prior to disturbance.

Figure 2, please label the road called, "The Big Sage Access Road" (BE)

Figure revised.

Figure 3 shows the facility area disturbance as 58.5 acres, but Spreadsheet B indicates 45.6 acres are disturbed. Please ensure consistency, or explain the parameters for determination more clearly. (BE)

A narrative is provided to describe the rationale for the surety calculation, and additional notes were added to the spreadsheets to describe where and how reclamation of each component will be conducted. Of the 58.5 acres of disturbance associated with the Facility Area, calculations for reclamation of 10.7 acres associated with interior roads are provided in Spreadsheet D (Haul/Access Roads), and calculations for reclamation of 2.2 acres associated with the stormwater retention pond are provided in Spreadsheet E (Miscellaneous).

105.1 Drawings or Cross Sections (slopes, roads, pads, etc.)

3.15 The plan does not clearly show all the hydrologic designs and features to be incorporated into the plan. Please update the figures to show the location of the swales, culverts, and drainages. (TM)

Figure 7 shows culvert locations, the stormwater retention pond, stormwater berm locations, and stormwater diversion locations. Figure 9 has been updated to show the location of the reclaimed swale.

3.16 The Division requests that you submit watershed maps and the supporting calculations that verify the size of the pond and the proposed diversions. These calculations need to apply to both the operational status of the mine and the reclaimed status. The plan states that the diversions and pond are sized to handle a 25-year, 24-hour storm but no calculations are presented, except that the 25-year, 24-hour storm is mentioned as being 2.31 inches. (TM)

Figure 7b has been added to show the sub-basin boundaries. Stormwater retention pond sizing calculations have been included in Appendix A.

3.17The reclamation treatments map does not show the following requested Aug. 20, 2007 information: On another reclamation map show the location of culverts, power lines, pipelines, deleterious storage sites (with dimensions), water storage, location of concrete rubble, and show the conveyor labeled by section. In addition, ensure there is an appropriate legend and identify the contour elevations. (BE)

Culverts, power lines, pipelines, water storage, and conveyors will be removed, and removal of these features is accounted for in the surety. As per the May 6, 2008 meeting, the surety narrative has been changed to reference Figure 6 for the location of these features. Deleterious materials storage sites are not present as noted in sections 2.4.18 Erosion and Sediment Control, 3.1 Surface and Ground Water Resources, and 4.6.3 Overburden/Fines Piles. The general locations of concrete rubble are noted in Figure 9.

The reclamation treatments maps(s) should show the berms, evaporation ponds, and diversion ditches as mentioned in page 32 of the draft plan. (BE)

As per the May 6, 2008 meeting, reference to berms, stormwater retention ponds, and diversion ditches has been removed from the discussion of reclamation treatments, as these features are not a part of the final reclamation configuration.

3.18Show on Figure 5 (or in a new figure), a geology layer is necessary as there may be a slide potential in the footwall shale layer. (BE)

As per the May 6, 2008 meeting, the exact location of the Chisholm Formation beneath the proposed quarry floor is unknown. Exploration drilling in excess of 100 feet beneath the planned excavation did not encounter shale. As noted in Section 2.4.2, mining is not expected to expose any formation identified as unstable. If quarrying intercepts unstable formations, slope stability will be evaluated, and the quarry design will be altered, as necessary.

Figure 5 has been revised to include an approximate location of the Chisholm Formation and Dome Limestone contact.

R647-4-106 - Operation Plan

106.2 Type of operations conducted, mining method, processing, etc.
There is indication that the waste piles will be accessed via benches. Some of the 25-ft. bench face width may be lost due to the 90^{O} bench face angles and access may become impaired. Please explain how bench face widths will be maintained subject to impaired widths and still allow for equipment access. (BE)

As per May 6, 2008 meeting, Section 2.4.1 has been modified to include the following statement, "Benches will be maintained at safe operating widths to allow access, where needed."

Section 2.4.3 Overburden/Fines Piles has been modified to include the following statement, "Overburden/fines piles access points will be rerouted or modified as mining progresses to provide for safe equipment access."

As noted in Section 2.4.1, minimum bench width will be about 25 feet but will typically be much wider.

As noted in Section 2.4.2, rockfalls and back-break will be reduced and managed by continuing to refine blasting designs and methods. Bench heights have been defined in order to allow equipment to work safely. However, if rockfall becomes a safety concern, mitigation measures will be taken, which may include bench scaling or avoidance.

106.3 Nature of materials mined, waste and estimated tonnages

Is dumped overburden a source of rockfall? ***This comment is in direct response to the following Aug. 20 Division review question: Provide information about the intersection area between the quarry areas and the stockpile areas. Address how stability will be maintained between them? (BE)***

As per the May 6, 2008 meeting, Section 2.4.3 has been modified to include the following statements, "Dumped overburden is not a source of rockfall. Overburden/fines piles are well drained, and much of the material is coarse, providing for greater stability."

The areas between the quarry and the overburden/fines piles are illustrated in Figure 5. Due to the relationship of the overburden/fines piles configurations with the quarry configurations shown in Figure 5 as well as shallow slopes (35 degrees or less for the overburden/fines piles and less than 45 degrees for the quarry slopes), the area between the overburden/fines piles and the quarry will be stable.

Provide information and outline the limiting factors regarding the bench width range in the quarries. (BE) Graymont response: minimum bench face widths are dictated by equipment operating requirements. Division response: Backbreak of 90° bench face angles could impair bench widths. Minimum bench widths are required for equipment and rockfall protection. (BE)

See response to 106.2.

106.6 Plan for protecting & redepositing soils
Section 2.4.7 says topsoil stockpiles will be seeded with the same interim seed mix as used on the Poison Mountain Quarry stockpiles, but the Division was unable to find this mix in the current plan. Please include a seed mix for interim stabilization of topsoil stockpiles or reference the location of this mix in the current plan. (PBB)

Section 2.4.7 has been revised to state, "The stockpile will be contoured to minimize wind erosion, and revegetated with the approved reclamation seed mix."

According to Table 4-2, no soil will be salvaged from the facilities area. Why is this? It appears to be all or mostly in the Sanpete-Spager Soil Association, and there is likely to be soil available. (PBB)

Table 4-2 has been modified to include soil salvage in the facilities area.

Page 25, Section 4.6.4 says drill holes will be plugged in accordance with R647-4-108. I haven't seen any discussion of drill holes.

Section 4.6.6 has been revised to state, "Any drill holes drilled as part of mining activities will be plugged in accordance with UDOGM rule R647-4-108."

106.7 Depth to groundwater, extent of overburden, geology
Please show and/or define well location. (BE)

Section 2.4.9 has the following description: "An existing well, shown in Figure 2, currently supplies water for the mining operations and processing facilities. Water use associated with the mining operations is generally limited to dust control on roads and disturbed areas as well as during drilling, crushing, and screening operations."

R647-4-109 - Impact Assessment

There is a plan statement located on page 20 of the draft that indicates the mine will operate according to MSHA regulations. It is important for the operator to know that mining operations must be performed and operation design must accomplish the requirements of the Utah Mined Land Reclamation Act.

As per the May 6, 2008 meeting, the statement on page 20 has been revised to state, "The Project will be permitted as a mining operation and will operate in conformance with applicable MSHA safety regulations (30 CFR 1-199) as well as in conformance with the requirements of the Utah Mined Land Reclamation Act and associated rules."

109.1 Impacts to surface and groundwater systems

The watershed map, Figure 7, is of too large a scale to show watershed boundaries. In order that the Division accept this plan it is required that the boundaries of the contributing watersheds be shown and the resulting drainage and impacts be clearly shown. Figure 7 fails to clearly show all these boundaries as the figures does not show a large enough area or provide all the drainage boundaries and contributing watershed areas. Diversion ditches, berms, swales, and ponds are identified without any engineering detail in the plan. Please provide this detail. (TM)

As per discussions and May 6, 2008 meeting, Figure 7b has been added to show the hydrologic sub-basin boundaries. Figure A-1 has been included in Appendix A to show typical diversion ditch, berm, and swale construction. A technical memorandum has been included in Appendix A detailing the engineering design for the stormwater retention pond.

On page 25 of the draft NOI, a sentence reads, "Surface waters will be managed to avoid excessive sediment loading and run off outside the project area". The Division assumes the project area is equal to the permit area, if that is the case, designs must be such that sediment from the disturbed areas is controlled. It is considered a violation if uncontrolled sediment flows outside of the permit area. (BE)

As per the May 6, 2008 meeting, the word "excessive" was removed.

Is the 280-ft groundwater depth the minimal groundwater depth? When was this depth to groundwater determined, including time of year? Where was it measured? Have seasonal variations been recorded? (BE)

As per the May 6, 2008 meeting, the following information has been added to the plan: "The actual groundwater depth has not been measured in the Big Sage Area. An exploration hole was drilled to a depth of 360 feet on the east side of the Facility Area, and water was not encountered. The hole was drilled May 5, 1997. Also, none of the other 76 exploratory drill holes in the Permit Area encountered water."

According to Figure 7, several ephemeral streams will be impacted by mining operations. The plan states, "no impacts to surface water resources are projected",

which is in direct conflict with what is shown on the Conceptual Storm Water Management Map. (BE)

As per the May 6, 2008 meeting, the text has been modified to state, "No impacts to surface water resources are projected beyond what is shown on Figure 7".

Further to the above comment, the streams beneath the central and north waste pile will be impacted among others. The central pile, NW location appears to impact water flow and a water impounding basin may occur. The north overburden pile toe is located within an ephemeral stream which will increase bedload which is in direct conflict with the "no impacts" comment. (BE)

As per the May 6, 2008 meeting and subsequent discussions, overburden/fines piles are well drained, as much of the material placed in the piles is coarse as shown in Table 2-3. Coarse overburden material is placed in the existing drainage channel at the base of the overburden/fines piles. Actual water input from the ephemeral drainage covered by the Central Overburden/Fines Pile is minimal due to contributing watershed (Figure 7 and 7b) and low precipitation levels (Tables 2-4, 2-5, and 3-1); therefore, the overburden/fines pile is not expected to cause water impoundment.

The drainage in the toe of the North Overburden/Fines Pile is within the buffer area of the pile and is not expected to be disturbed; however, a diversion will be constructed, if necessary.

Appendix A includes a conservative calculation showing that very little water (1,500 cubic feet) may pond behind the central overburden/fines pile during a 100-year, 24-hour storm event. The pond that may form will drain about an hour after the rainfall event. These calculations indicate a significant impoundment will not occur behind the pile.

109.3 Impacts on existing soil resources

The plan narrative indicates that explosives, explosive packaging are handled according to federal and state requirements or according to manufacturing requirements. Do these requirements outline operator/worker safety only? Or do they include provisions to ensure environmental impact is minimized? If they don't, please specify and outline how they will be managed. (BE)

Under Mine Safety and Health Administration regulations, mine operators have a Hazard Communications Program, which requires that Material Safety Data Sheets (MSDS) be maintained at site. MSDS for explosives provide health and first aid information as well as safe handling procedures for storage and transport, spill or leak procedures, and disposal procedures. The storage and transport, spill or leak, and disposal procedures address personal safety as well as safety to wildlife and the environment.

109.4 Slope stability, erosion control, air quality, safety

AIR QUALITY

Provide a copy of the Air Quality Approval Order as an appendix to the plan including the dust control plan. If there are specific emission requirements for any

equipment, please provide a list of that equipment. This information is helpful to ensure air quality requirements are met. (BE)

The Air Quality Approval Order and *Dust Control Plan* are included in Appendix B.

EROSION CONTROL

On the reclamation treatments map, please show the areas that are projected to have accelerated erosion and will be contour furrowed. (TM)

Figure 9 has been revised to show projected contour furrowing locations.

Provide berm dimensions, or a copy of the MSHA regulations for berm design. Does MSHA have a berm regulation for berm design for an environmental application? It is assumed there would be a typical MSHA design berm requirement for haul roads or any location where a worker is operating. What style of berms will be used? Provide dimensions. See surety section and update if required. (BE)

Safety berms will be constructed in accordance with MSHA regulations.

Stormwater berm dimensions will vary with topography; however, conceptual dimensions are approximately three feet high with side slopes of 2H:1V and crest widths of one foot. Conceptual storm water berm design configuration is provided in Appendix A.

STABILITY

It is unclear if the bonded area is equal to the permit area. The Division assumes the permit area and the bonded area are the same unless there is a phased mine plan. Therefore, there is concern regarding stability associated with the central overburden/fines pile in the west and east Graymont fee land border. According to the submittal, some of this area will not be revegetated, and stability may be compromised. If slope failure occurs, it will impact adjacent land. A set back may be required. This comment is related to Division comment made per previous Division review 106.9. If the buffer zones exist, it is not apparent. Show the buffer zone(s) on a map and provide narrative indicating the footage. (BE)

The bonded area is equal to the permitted area. Consideration has been given in design to prevent disturbance of adjacent lands. Mitigations include slope design and voluntary setbacks. Although the bonded area boundary and the property boundary is equivalent in some areas, disturbance has not been planned within 50 feet of the property boundary. This can be observed in Figures 3, 7, and 9.

Due to the shallow slopes (35 degrees or less for the overburden/fines piles), the overburden/fines piles will be stable. Much of the overburden/fines piles consist of coarse material, enhancing stability. Overburden/fines piles have been constructed at angle of repose (stable by definition) at other Cricket Mountain quarries, and these piles have been stable. The overburden/fines piles at Big Sage will be constructed in a similar manner to overburden/fines piles at other Cricket Mountain quarries and are expected to be stable.

Some Mining operations will result in vertical bench faces, how will they be maintained? If sloughing/failure occurs, the bench widths will be impacted. Can a minimum of 25 ft bench widths be maintained at all times with vertical bench face angles? (BE)

See response to 106.2.

The NOI draft narrative on page 27 indicates there are "appropriate mitigation measures in place to minimize impacts". The rules specifically require that the impact mitigation measures are defined. The draft statement is too vague. (BE)

Mitigation measures are described in Section 2.4.2 and were added to Section 3.5 as follows:

Rockfalls and back-break will be reduced and managed by continuing to refine blasting designs and methods. Bench heights have been defined in order to allow equipment to work safely. However, if rockfall becomes a safety concern, mitigation measures will be taken, which may include bench scaling or avoidance.

The quarries will be regularly monitored for any signs of instability, such as significant raveling or fault exposure, and the quarries will be managed in accordance with MSHA safety guidelines and the Big Sage Project operations and reclamation plan. Quarry slopes and benches will be regularly monitored by quarry crews, supervisors, and when required, mining engineers.

109.5 Actions to mitigate any impacts

Recommendation:

The R647 rules do not mention impacts to species other than those listed as threatened or endangered, but it appears the nests of some non-listed, protected bird species might be in the area proposed for disturbance. Map 4 within the report titled "Biological Survey for the Proposed Iron Basin Quarry, Millard Co., Utah" shows the locations of nests, but it is impossible to correlate this map with the maps showing the disturbance area. Protection of these nests is not required under the Mined Land Reclamation Act, but is required under other laws, such as the Migratory Bird Treaty Act and the Bald Eagle Protection Act. This plan does not need to include protection measures, but the operator needs to coordinate its activities with the Fish and Wildlife Service. (PBB)

Comment noted. The *Baseline Studies for the Big Sage and Allsop Quarry Projects*, May 2007 report by SRK Consulting states that no active raptor nests were identified in the Big Sage Project Area during the April 2007 survey.

R647-4-110 - Reclamation Plan

General Comments: Please elaborate on the comment, "Reclamation and closure of the disturbance areas will be similar to that of the Cricket Mountain Mine." It may be necessary to identify and point to the information about Cricket Mountain reclamation and closure plans that apply to the Big Sage Project. Please be specific and include reclamation information according to R647-4-110.2. (BE)

As per the May 6, 2008 meeting, the statement, "Reclamation and closure of disturbance areas will be similar to that of the Cricket Mountain Mine" has been removed. All pertinent information regarding reclamation is included in the NOI.

110.2 Roads, highwalls, slopes, drainage, pits, etc., reclaimed
Please provide the location of the reclaimed swale mentioned on page 33 of the plan and its contributing watershed. (TM)

Figure 9 has been revised to show the reclaimed swale location.

There is a comment made that reclamation will occur in such a way that drainages will be stable. However, the plan intercepts flow in many drainages. The plan should more specifically define how the overburden pile is designed in such a way that its stability will not be affected by these intercepted water courses. The plan does outline overburden pile design to control run off. (BE)

As per the May 6, 2008 meeting and subsequent discussions, much of overburden/fines piles consist of coarse material providing stability and drainage. The coarse overburden material (Table 2-3) will be placed in the existing drainage channel at the base of the overburden/fines piles to enhance drainage. Actual water input from the ephemeral drainage covered by the Central Overburden/Fines Pile is minimal due to contributing watershed (Figure 7 and 7b) and low precipitation levels (Tables 2-4, 2-5, and 3-1). Appendix A includes a conservative calculation showing that very little water (1,500 cubic feet) may pond behind the central overburden/fines pile during a 100-year, 24-hour storm event. The pond that may form will drain about an hour after the rainfall event. These calculations indicate a significant impoundment will not occur behind the pile.

The drainage in the toe of the North Overburden/Fines Pile is within the buffer area of the pile and is not expected to be disturbed; however, a diversion will be constructed, if necessary.

Due to the shallow slopes (35 degrees or less for the overburden/fines piles), the overburden/fines piles will be stable. Overburden/fines piles have been constructed at angle of repose (stable by definition) at other Cricket Mountain quarries, and these piles have been stable. The overburden/fines piles at Big Sage will be constructed in a similar manner to overburden/fines piles at other Cricket Mountain quarries and are expected to be stable.

110.5 Revegetation planting program
Recommendations:
The revegetation monitoring reports indicate that Siberian wheatgrass is present in reclaimed areas even though it was not seeded (unless it was a contaminant with

crested wheatgrass). Siberian wheatgrass is very drought tolerant and competes well with cheatgrass, and the Division recommends that it be included in the seed mixture at a rate of about two pounds PLS/acre. The recommended variety is Vavilov II.

Another grass that should do well in this environment is "Secar" Snake River wheatgrass (formerly identified as Bluebunch wheatgrass), and the Division recommends including this species at a rate of about one or two pounds PLS/acre. This species is also very drought tolerant and competes well with cheatgrass. (PBB)

Graymont will consider these recommended seeds for test plots. Depending upon test plot results, Graymont will consider revising the seed mix to include these seeds.

The plan says seed would be broadcast or drilled depending on conditions, but forage Kochia should always be broadcast seeded. Please change the plan accordingly. (PBB)

The drill seeding option has been removed from the Plan and the surety calculation.

Figure 9 shows some areas where no revegetation will be done, and Section 4.6.3 says slopes of the overburden/fines piles that are recontoured to an angle safe for equipment will be covered with a layer of soil and seeded. This appears to be a variance, and the plan needs to include either a variance request with adequate justification or it needs to show why this is not a variance. If the overall site, including these unvegetated areas, will have 70 percent of the pre-mining vegetative cover, then no variance is needed. If a variance is requested, it will need to show the variance requested and the area that would be affected, justification for the variance, and alternate methods or measures to be utilized. (PBB)

Assuming sufficient soil is available, the overall site will be revegetated to 70 percent of existing vegetative cover. Figure 9 has been updated to indicate this.

R647-4-112 – Variance **None requested**

R647-4-113 – Surety

General Comments: It is helpful to provide a surety narrative in addition to the spreadsheets that includes assumptions and thoughts. In addition, each reclamation category can be fully explained in the narrative. (BE)

A narrative has been provided in Appendix D.

How many 'bonded' acres are on state lands? (BE)

Table 2-1in the NOI provides the amount of disturbance that will be on private lands and the amount of disturbance that will be on state lands. Only an estimated 33% of the buffer zones around the quarry areas and the overburden/fines piles are anticipated to be disturbed. As such, the surety calculation only includes reclamation costs for 33% of the buffer zones. If more disturbance is planned in within the buffer zones, Graymont will increase the surety as appropriate prior to disturbance. The Summary spreadsheet in

Appendix D indicates the acreage that will be bonded, and further details are provided in the surety narrative also located in Appendix D.

<u>Spreadsheets:</u>

Please define contour/regrade. There are no costs associated with this effort, and it is assumed this is a typical component of earthwork. (BE)

For surety calculation purposes contour/regrade was considered earthworks to return a feature to a natural landform or to develop a landform in preparation for topsoil placement and subsequent seeding.

Costs are included for regrading stormwater berms and the stormwater retention pond in Spreadsheet E of the surety calculations. A discussion of other contouring/regrading is included in the narrative provided in Appendix D.

When referring to RS Means as a cost source, please refer to the title and edition of the MEANS book. In the case of RS Means 017413.200040 located on the Reclamation Cost Summary, state "Site Work & Landscape Cost Data, 26th edition". (BE)

RS Means Heavy Construction Cost Data, 2007, edition 21. These references are included in the surety calculation spreadsheets.

The surety calculation spreadsheet does not match the assigned alpha system in the summary spreadsheet, reclamation cost summary (rcs). For example, the rcs references E, F, G and those spreadsheets are not included in the Dec. 2007 submittal. There is one spread sheet that has alpha references A-F that may be considered 'miscellaneous', but without the proper reference and identification, it is unknown. (BE)

The surety calculation spreadsheets have been corrected to match the alpha system in the summary spreadsheet.

Within each reclamation category, there should be a breakdown that shows the specifics within the category. It is helpful to maintain consistency regarding word choices. For example, map #6 labels topsoil stockpile and facilities area, then spreadsheet B refers to this area as yards and stockpiles. This information may be apparent if there was a narrative that outlined the process behind the content of each category. (BE)

A narrative has been provided in Appendix D.

Graymont indicated the word 'resoil' was changed to 'topsoil replacement', but the word is still used throughout the spreadsheets. (BE)

The word 'resoil' was changed to 'topsoil replacement'.

Spreadsheet B indicates there is 2-feet of fill over 5-acres of the facility area. This area is shown on Map #6. A solid and hazardous waste permit may be required. (BE)

As per meeting on May 6, 2008, spreadsheet B has been modified to indicate that two feet of growth media and/or fines will cover approximately five acres of the Facility Area where rubblized concrete is buried.

Because spreadsheet B identifies the facilities area, it is important to asterisk and provide notation about the location of the costs associated with the facility demolition/removal. (BE)

The notation was added.

There does not appear to be a spreadsheet dedicated to facility removal/demolition. Subpart (A) on unnamed spreadsheet, refers to Structure Demolition and Disposal Facility, but appears to be incomplete. (BE)

Structures that will be removed/demolished include pipelines, power lines, substations, diesel fuel storage, gasoline fuel storage, explosives magazines, and water storage, and costs are provided for demolition and removal on Spreadsheet E of the surety calculation. Costs are provided for foundations that will be rubblized and buried under approximately two feet of growth media and/or fines in Spreadsheet F. Building demolition costs are provided in Spreadsheet G.

Please explain why there is no contouring or regrade in the facility and topsoil areas. What is the elevation variation? What is the final grade? (BE)

A discussion of the contouring in the Facility Area and Topsoil Stockpile locations is provided in the narrative in Appendix D.

Figure 3 shows the facility area disturbance as 58.5 acres, but spreadsheet B indicates 45.6 acres are disturbed. Please ensure consistency, or explain the determination parameters more clearly. This comment is a repeat. (BE)

A discussion of the determination of reclamation parameters is provided in the narrative in Appendix D.

Division August 2007 comment: Spreadsheet C indicates there is no contouring in the quarry area. Please provide explanation regarding how the quarry areas blend with the surrounding topography without any contouring. Seeding is shown on 131 acres, and the quarries comprise 391.7 acres. The Division expects revegetation of the entire area unless a variance is granted. (BE)

The quarry will be constructed in such a manner as to blend with the surrounding topography. Assuming sufficient soil is available, the overall site will be revegetated to 70 percent of existing vegetative cover.

Graymont has indicated that bench faces will not be seeded. It is expected the revegetation success is achieved when 70% of the premining vegetative cover will

occur. How will you meet this requirement and not seed the bench faces? A variance may be required. (BE)

As the bench faces are vertical, bench faces comprise a small amount of the total area. The original surface includes numerous cliff faces that are nearly devoid of vegetation. Assuming sufficient soil is available, the overall site will be revegetated to meet an average pre-mining cover of 70%.

Although spreadsheet E is not included, please ensure there is verbiage clarification in the spreadsheet to develop understanding of what is meant by 'maintenance' 'percentage of total disturbance. Graymont's comment indicated that it is expected that 10% of the revegetation will fail, and a subsequent seeding is necessary. Please ensure a clarification of this intent is made. Please include costs for second seeding. (BE)

Spreadsheet E has been properly labeled and included in Appendix D. A narrative is also included in Appendix D to describe maintenance and percentage of total disturbance. Costs for a second seeding are included.

If the basis for the 10% maintenance is professional experience, please provide that information in spreadsheet E. (BE)

The notation has been included in Spreadsheet E.

Please ensure spreadsheet E indicates/states that removal of conveyor will be performed by a purchaser. (BE)

Spreadsheet E states, "Dismantled conveyors will be removed from site by scrap dealer or purchaser on their trucks."

There is a comment by Graymont that spreadsheet shows infrastructure removal costs. This information is unclear. Please provide specific direction to its location. If the information is not included, please add. If it is included, please ensure it is complete. (BE)

Infrastructure removal costs are located on Spreadsheet E, Section A – Structure Demolition and Disposal and includes pipeline removal, power line and substation removal, fuel storage tank removal, explosives magazine removal, and water storage removal.

The spreadsheet berm dimensions to result in a small berm design. Please explain and/or justify the reasons they will be effective. (BE)

Stormwater berms are large enough given the amount of precipitation in the area as described in Tables 2-3, 2-4, and 3-1.

Please assist in pointing out spreadsheet location that includes costs associated with the implementation of berms, storm water diversion ditches, and evaporation ponds in reclamation. It appears to be located in spreadsheet "SUMMARY". It is helpful to

provide enough detail in the spreadsheet titling to increase transparency and clarity. (BE)

Reclamation costs for stormwater controls are located on page 3 of Spreadsheet E.

Division comment from prior review: Removal and disposal of hazardous materials should be included. Graymont reply: transport of waste oil from the site to the plant as per current practice at the other Cricket Mountain Project has been included in spreadsheet E. Division reply: Spreadsheet E is not included in the submittal. (BE)

Spreadsheet E has been properly labeled and is included in Appendix D.

Per the above comment, this comment applies to several other Graymont responses to the Division's review. Please check over your responses to ensure all the stated information is included in the specified spreadsheets. (BE)

Comment noted.

Please call me at 801.264.6877 if you have any questions regarding our responses or wish to discuss them further.

Sincerely,

Andrew Rupke
Geologist, Graymont Western US Inc.

cc:

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GRAYMONT

September 30, 2008

State of Utah
Department of Natural Resources
Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, UT 84114-5801

Dear Mr. Baker,

Attached to this letter is the 3rd submittal of the Notice of Intention (NOI) to Revise Mining Operations: Big Sage. The revision is an expansion of Graymont's Cricket Mountain Project in Millard County, Utah. The expansion is located to the southwest of the existing project area and will add 611.1 acres of permit area to the overall Cricket Mountain Project. The expansion consists of a new quarry area, overburden and fines piles, a topsoil stockpile, and related facilities.

Included with this submission (in the binder pocket) is a response letter to the DOGM's second set of review comments. Changes to the NOI are in redline strikeout format. New storm water control calculations are included in Appendix A and an updated surety calculation and narrative has been included in Appendix D. A working copy of the NOI has been provided for your convenience.

The DOGM is also currently reviewing the Fingers Quarry amendment, and the Big Sage revision is a lower priority for Graymont.

If you have any questions or concerns regarding this submission, please contact me at 801-264-6877 (office) or 801-243-6685 (cell). Thank you very much for your attention to this matter.

Regards,

Andrew Rupke

Andrew L. Rupke
Geologic Services
Graymont Western US Inc.
3950 S. 700 E., Suite 301
Salt Lake City, UT 84107

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DIV. OF OIL, GAS & MINING

Graymont Western U.S., Inc.
Cricket Mountain Project, Utah

Notice of Intention to ~~Amend~~ Revise Mining Operations

Big Sage

GRAYMONT

Graymont Western, U.S., Inc.
3950 South 700 East
Suite 301
Salt Lake City, Utah 84107

Prepared by:

SRK Consulting
Engineers and Scientists

SRK Consulting (U.S.), Inc.
1250 Lamoille Highway, Suite 520
Elko, Nevada 89801

Revised September 2008
Revised December 2007
Revised May 2007
SRK Project No. 138406

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1. INTRODUCTION AND GENERAL INFORMATION

The Cricket Mountain Mine is an existing limestone mining and processing operation located in west-central Utah. The Mine is owned and operated by Graymont Western U.S., Inc. (Graymont) and consists of a limestone quarry, overburden disposal sites, screened undersize material stockpiles, haul roads, ~~a processing plant,~~ and ancillary facilities located on unpatented mining claims on public lands administered by the United States Department of the Interior, Bureau of Land Management (BLM), on lands leased from the State of Utah, and on private lands owned by Graymont. The general location is shown on Figure 1. The Mine received approval of its Plan of Operations from the Warm Springs Field Office in Fillmore, Utah. A Notice of Intention (NOI) for the existing Project was approved by State of Utah, Division of Oil, Gas and Mining (UDOGM) on January 1, 1981 (M/027/006). Additional NOIs have been subsequently filed.

Mining on Utah state lands is permitted under the Utah Mined Land Reclamation Act of 1975, Title 40, Chapter 8 of the Utah Code Annotated as amended (Utah Reclamation Act). The Minerals Reclamation Rules (R647-1 through R647-5) are enforced by UDOGM.

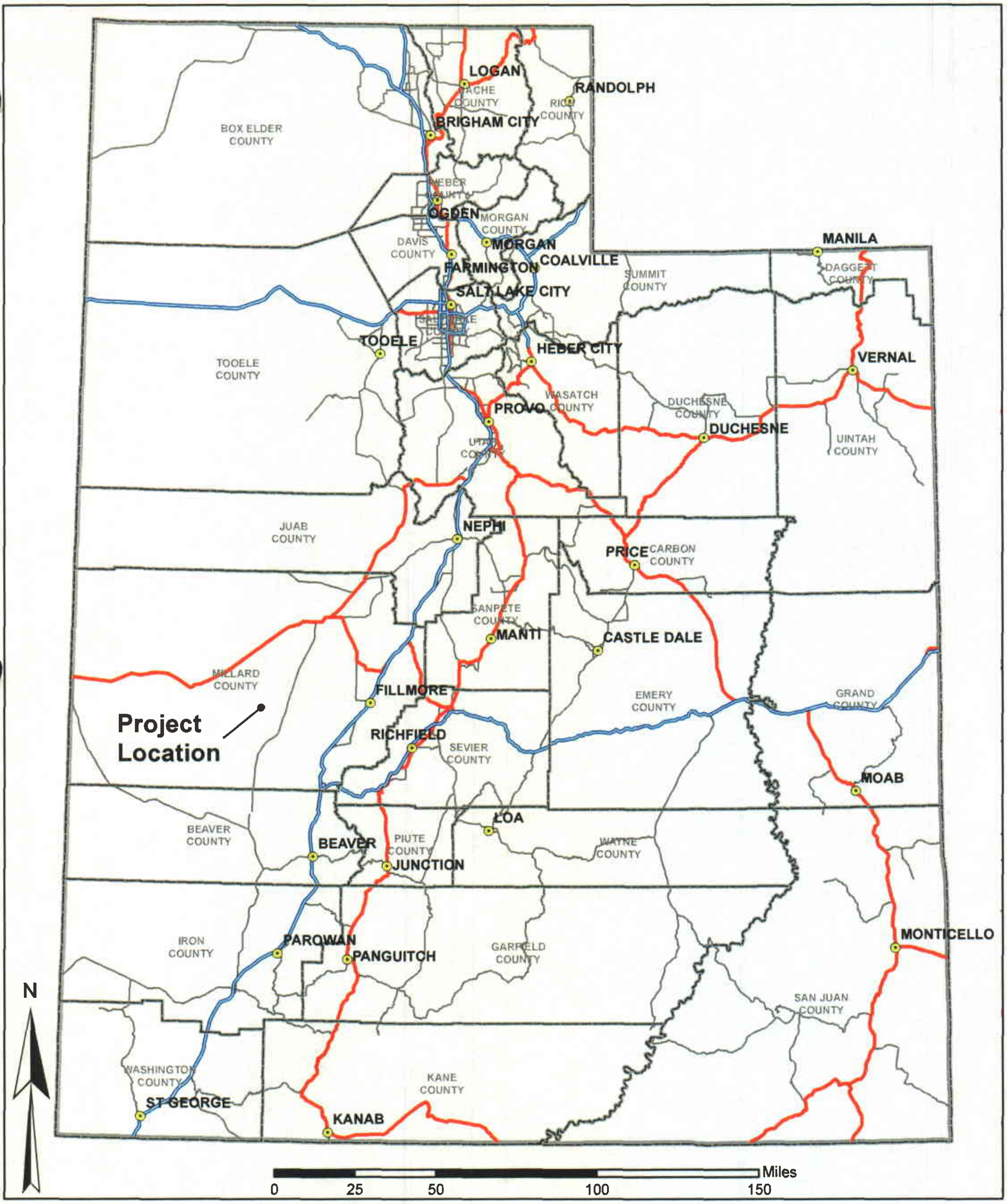
The Big Sage Project will provide limestone for commercial use. The Project will be located on state land and private land owned by Graymont. Limestone will be mined, crushed, screened, and transported to ~~the existing Cricket Mountain Plant~~a processing plant via the Big Sage Access Road and existing roads. If required to meet future production levels, limestone may be transported to the existing Poison Mountain facilities for processing. The following activities will be conducted at the Big Sage Project:

- Develop the Big Sage North and South quarries;
- Develop the North and Central Overburden/Fines Piles;
- Construct the Facility Area, which includes a warehouse, a maintenance shop, a first aid room, an office, a lunch room, a truck washing station, water tanks, a fuel tank, ammonium nitrate and fuel oil (ANFO) storage, a primary crusher, a

secondary crusher, conveyors, screens, limestone stockpiles, a fines stockpile, and interior roads;

- Establish an explosives magazine within the quarry footprint; and
- Establish a water tank within the quarry footprint.

This NOI is prepared in accordance with UDOGM R647-1 through R647-5 rules for submittal. The NOI includes a general description of the mine, operating procedures, reclamation, measures to be taken to prevent unnecessary or undue degradation, and measures to be taken during extended periods of non-operation.



EXPLANATION

- City
- Limited Access
- Highway
- Major Road

DESIGNED	VS	04/11/07
DRAWN	JQG	04/11/07
CHECKED		
APPROVED		
REVISED		
REVISED		

FIGURE 1

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
MILLARD COUNTY, UTAH
LOCATION MAP

SRK Consulting
Engineers and Scientists

SCALE:	AS SHOWN	REVISION
JOB NO:	138406-200	A
MAP NAME:	RptB_Fig1_UT_Location_Map_JQG.mxd	

Path: G:\Sites\Cricket_Mountain\Graymont_Western\138406_000_ALLSOP_BIGSAGE_BASELINE\RptB_Fig1_UT_Location_Map_JQG_20070411.mxd

1.1 Applicant Information

Graymont Western U.S., Inc.
3950 South 700 East
Suite 301
Salt Lake City, Utah 84107

Contact:	Michael R. Brown
Phone:	(801) 264-6880
Fax:	(801) 264-6874

1.2 File Number

The previously assigned UDOGM file number for the Cricket Mountain Mine is M/027/006. The latest approved revision to M/027/006 is dated March 2006.

1.3 Location of Activities

The Big Sage Project is located approximately 38 driving miles southwest of the city of Delta, in Millard County, Utah. ~~The Cricket Mountain Plant is located west of Highway 257 near Bloom Siding in Section 36, Township 21 South (T21S), Range 9 West (R9W) and Section 1, T22S, R9W.~~ The Big Sage Project can be reached by traveling along existing and authorized access roads approximately seven miles west ~~of the Plant~~ of the Bloom railroad siding in the southeast corner of Section36, Township 21 South (T21S), Range 9West (R9W) as shown ~~in (~~Figure 2~~)~~. The Big Sage Project is located in sections 2, 3, 10, and 11, T22S, R10W, SLBM, (P~~roject~~ermit Area), within the area of the U.S. Department of the Interior Geologic Survey (USGS) 7.5 minute series topographic map of the Candland Spring Quadrangle. Access to the Big Sage quarries and facilities is by improved, unpaved roads. Figure 3 shows the project layout.

1.4 Ownership of Land Surface and Minerals

The quarries, overburden/fines piles, and facilities will be located on private land owned by Graymont. The northeastern portion of the Big Sage North Quarry Area will be located on state lands leased by Graymont (lease number ML 35572). Roads will be located on state land leased by Graymont and on private lands controlled by Graymont; an easement (#1246) has been granted by the State of Utah School and Institutional Trust Lands Administration (SITLA) for the Big Sage Access Road. The mailing address and telephone number for Graymont is provided above, and the mailing address and telephone number for SITLA is as follows:

State of Utah

School and Institutional Trust Lands Administration

675 East 500 South, Suite 500

Salt Lake City, UT 84102

Phone: (801) 538-5100

1.5 BLM Project File Number

Not applicable. The Big Sage Project does not occur on land administered by the BLM.

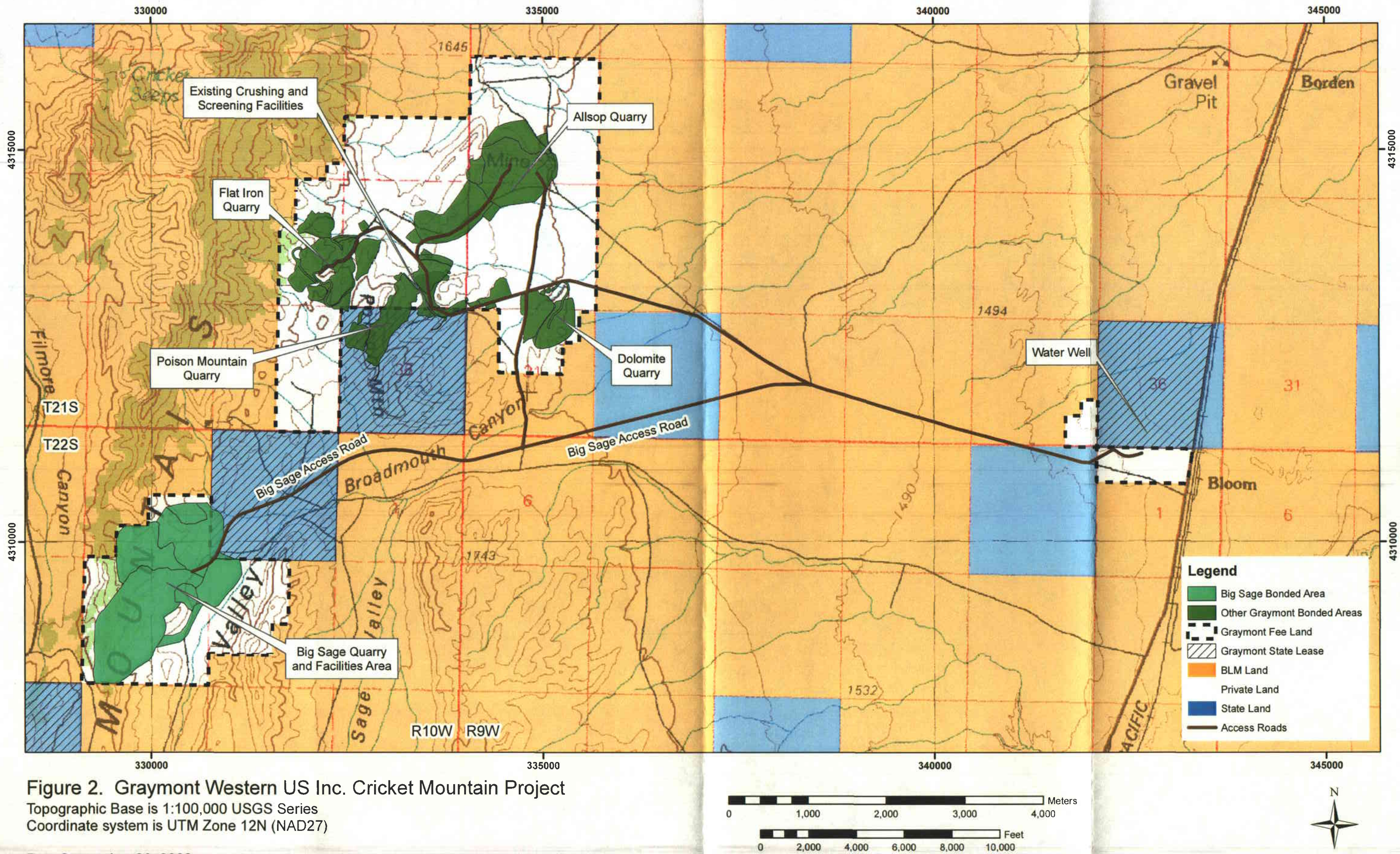


Figure 2. Graymont Western US Inc. Cricket Mountain Project
Topographic Base is 1:100,000 USGS Series
Coordinate system is UTM Zone 12N (NAD27)

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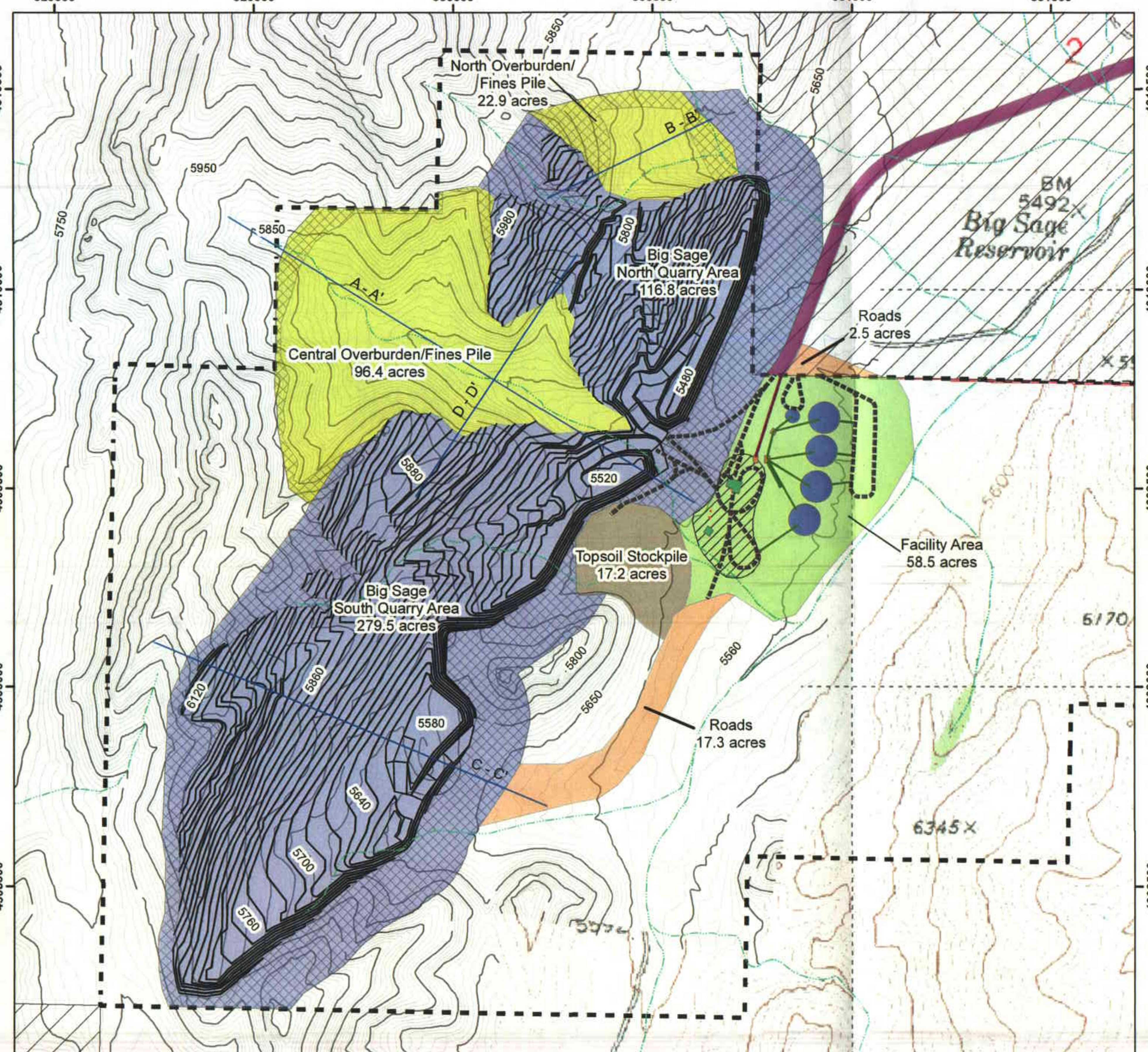

Figure 3. Big Sage Quarry Layout

-Surveyed Topography has 10 foot Contour Intervals
-Topographic Base is Candland Spring, UT
7.5' USGS Quadrangle 40 foot Contour Intervals
-Quarry Topography has 20 foot Contour Intervals
-Coordinate system is UTM Zone 12N (NAD27)

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- Graymont Fee Land
- Graymont State Lease
- SITLA Easement
- Conceptual Pit Topography
- Conceptual Interior Roads
- Ephemeral Drainages
- Cross-Section Locations

Big Sage Bonded Areas

- Quarry Areas
- Overburden/Fines Piles
- Facility Area (see Figure 6 for more detail)
- Topsoil Stockpile
- Road Disturbance
- Buffer Areas

1.6 Project Disturbance

The ~~Project Area~~Permit Area has not been previously disturbed.

1.7 Project Schedule

Development of the Big Sage Project will begin as soon as permits are approved. Production is planned to begin in 2009.

2. Operation Plan

2.1 Overview of Operation

The Cricket Mountain Mine presently consists of limestone quarries (Poison Mountain Quarry, BB Dolomite Quarry, Flat Iron Quarry, and Allsop Quarry areas) ~~and a processing plant (Cricket Mountain Plant)~~. The quarry operations consist of the excavation of high calcium limestone from outcropping deposits, crushing and sizing the stone near the quarry, and transporting the crushed and sized limestone to a processing facility. ~~the Plant~~. Components associated with the mine include haul roads, overburden/fines piles, undersize material stockpiles, soil stockpiles, and a crusher. ~~The Plant consists of rotary kilns which produce quicklime by high temperature calcinations of the limestone. Current lime production capacity at the Plant is 3,040 tons per day (tpd)~~ Quicklime is the ultimate commercial product from ~~the~~ a large portion of the mine operation and is used for industrial and chemical purposes, such as pH control and fluxing. The existing operations are shown on Figure 2.

The Big Sage Project is located southwest of the existing limestone quarries. Limestone from the Big Sage Project will be added to the existing Cricket Mountain reserves. Graymont will conduct the following activities at the Big Sage Project:

- Develop the Big Sage North and South quarries;
- Develop the North and Central overburden/fines piles;
- Construct the Facility Area, which includes a warehouse, a maintenance shop, a first aid room, an office, a lunch room, a truck washing station, water tanks, a fuel tank, ANFO storage, a primary crusher, a secondary crusher, conveyors, screens, limestone stockpiles, a fines stockpile, and interior roads;
- Establish an explosives magazine within the quarry footprint; and
- Establish a water tank within the quarry footprint.

Table 2-1 presents the planned ~~surface disturbances~~areas for the Big Sage Project. Planned ~~Surface disturbance calculations~~areas include a buffer zone around each component to account for access and unforeseen disturbance requirements. The Permit Area contains 611.1 acres, of which 515.6 acres is estimated to actually be disturbed. As shown in Figure 3, the Permit Area includes buffer zones (142.6 acres) around each component to account for access

Formatted: Space Before: 3 pt, Line spacing: single and unforeseen disturbance requirements. Estimated actual disturbance within the buffer zones is estimated at 33 percent. As such, the surety calculation only includes reclamation costs for 47 acres associated with buffer zones; however, if more disturbance is planned within the buffer zones, Graymont will increase the surety accordingly prior to disturbance. Reclamation costs are based on 483.1 acres because the quarry bench faces will not be reclaimed (32.5 acres). Table 2-2 presents the acreages by mine component within the Permit Area, the disturbance acreages, and the reclamation acreages.

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Table 2-1: Planned ~~Surface Disturbance~~Mine Components

Component	Private (acres)	State (acres)	Total ~~Disturbance~~Permit Area (acres)
Big Sage North Quarry Area[1]	96.7	20.1	116.8
Big Sage South Quarry Area[1]	279.5	0.0	279.5
North Overburden/Fines Pile	22.9	0.0	22.9
Central Overburden/Fines Pile	96.4	0.0	96.4
Facility Area[1]	58.5	0.0	58.5
Roads	17.3	2.5	19.8
Topsoil Stockpile	17.2	0.0	17.2
Total	588.5	22.6	611.1

[1] Acres include interior roads.

Table 2-~~22~~1: Big Sage Surface Disturbance

Component	Permit Area (acres)	Disturbance Area (acres)	Reclamation Area (acres)
Quarries	396.3	314.9	282.4
Overburden/Fines Piles	119.3	105.2	105.2
Facility Area	58.5	58.5	58.5
Roads	19.8	19.8	19.8
Topsoil Stockpile	17.2	17.2	17.2
Total	611.1	515.6	483.1

2.2 Site Geology and Ore Characteristics

The Cricket Mountains consist primarily of sedimentary strata cut by north-trending normal faults. The strata are tilted to the east, exposing younger rocks on the east side of the range. The strata in the Big Sage ~~Project Area~~Permit Area generally dip~~s~~ from 15 to 20 degrees to the east. Figure 4 shows the geology in the ~~Project Area~~Permit Area.

The limestone ore in the ~~Project Area~~Permit Area is located in Middle Cambrian rocks. The stratigraphic units of interest are listed below in descending chronological order:

Trippe Limestone – The Lower Member of the Trippe Limestone is a dark-gray ledge-forming limestone and light gray to white slope-forming dolomitic boundstone.

Limestone of Cricket Mountains – Mostly dark-gray argillaceous and silty limestone commonly mottled with irregular patches of brownish-gray limey dolomite. In the Poison Mountain area, the lower 700 feet of the formation consists of medium to dark-gray lime mudstone that forms ledge and slope topography. This is overlain by 300 feet of light brownish gray cliff-forming dolomite. The dolomite is overlain by dark gray limestones. The formation is reported to be approximately 2,000 feet thick.

Whirlwind Formation – Predominately light olive-gray slope-forming shale interbedded with thin-bedded limestone. The Whirlwind Formation is 200 to 260 feet thick.

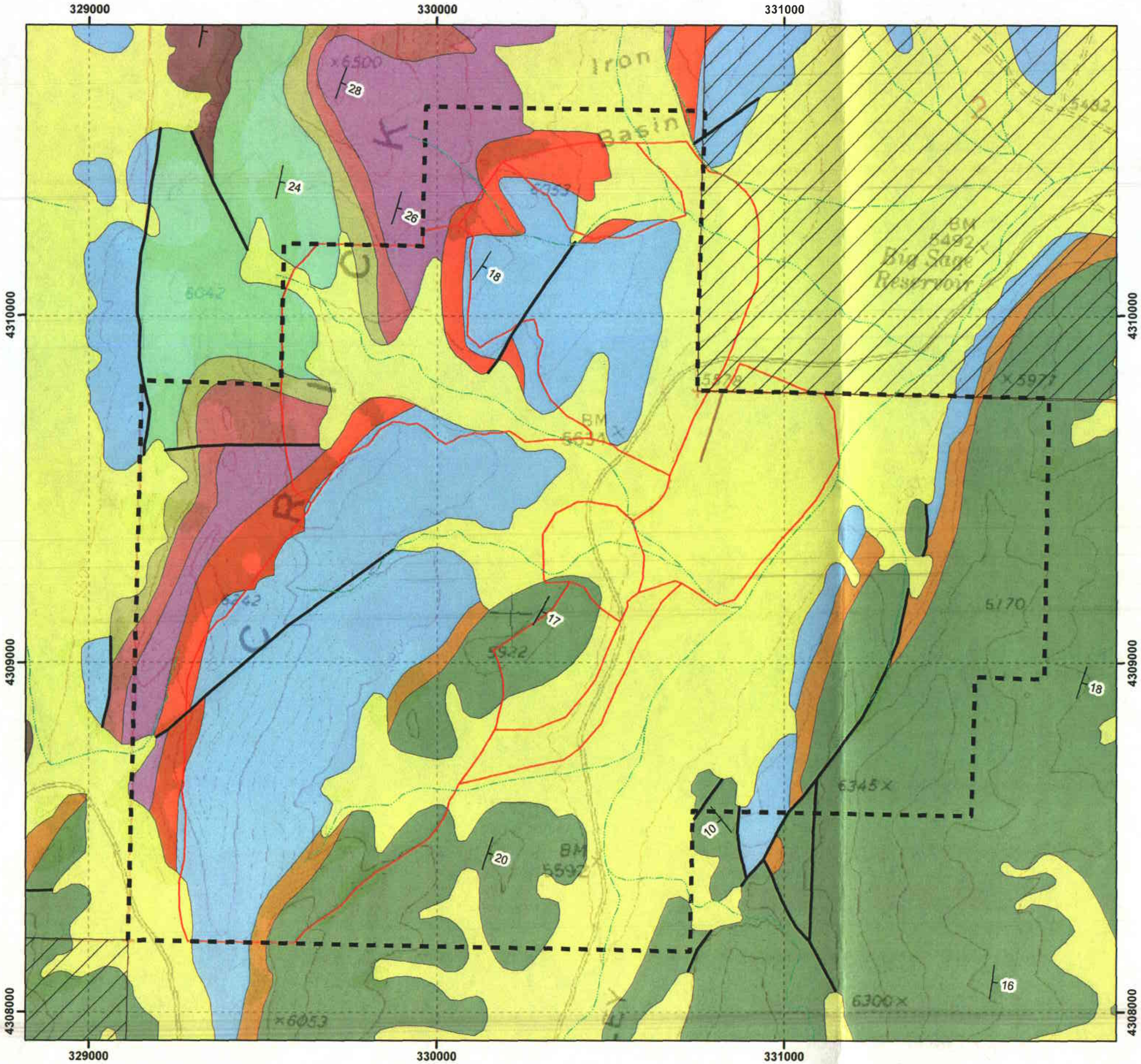

Figure 4. Big Sage Geologic Map

-Geology is from Lehi Hintze (USGS Open File Report 84-683)
-Topographic Base is Candland Spring, UT
7.5' USGS Quadrangle
-Coordinate system is UTM Zone 12N (NAD27)

Rev. Dec 10, 2007
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Big Sage Bonded Areas
Graymont Fee Land
Graymont State Lease
Ephemeral Drainages
Strike and Dip of Bedding
Normal Faults

Geologic Units

Qa - Quaternary Alluvium
Tc - Tertiary Conglomerate
Ctl - Cambrian Trippe Limestone (Lower Member)
Ccm - Cambrian Cricket Mountain Limestone
Cw - Cambrian Whirlwind Formation
Cd - Cambrian Dome Limestone
Cc - Cambrian Chisholm Formation
Chu - Cambrian Howell Limestone (Upper Member)
Chm - Cambrian Howell Limestone (Millard Member)
Cpt - Cambrian Pioche Formation (Tatow Member)
Cpl - Cambrian Pioche Formation (Lower Member)
Cpm - Cambrian Prospect Mountain Quartzite

0 200 400 600 800 1,000 Meters
0 500 1,000 1,500 2,000 Feet

N

Dome Limestone – Cliff-forming light gray massive limestone. The basal third is medium to dark gray and forms dark ledges above the underlying upper Chisholm Formation slope. The middle third is commonly considered to be mostly calcisiltite with ten percent oolitic beds and numerous horizons of secondary dolomite. However, in the area of the Graymont quarries, this zone is characterized by high-calcium micrite and constitutes ore. The upper third of the Dome Limestone contains much dolomitic algal boundstone that forms a ledge and slope topography. The Dome Limestone ranges in thickness from 230 to more than 300 feet.

Chisholm Formation – The upper portion of the Chisholm Formation is an olive-gray to reddish-brown shale approximately 15 to 50 feet thick. The exact location of the Chisholm Formation beneath the quarry floor is unknown. Exploration drilling in excess of 100 feet beneath the ore -zone in the quarry excavation did not encounter shale.

2.3 Site Preparation

Where available and safe, soils will be stripped from quarry and stone stockpile areas and salvaged for use as growth media during reclamation. Where feasible, vegetation growing on areas containing salvageable soils will be removed and stored in the topsoil stockpile to contribute organic matter to the soils. The topsoil stockpile will be located between the Big Sage South Quarry Area and the Facility Area as shown in Figure 3.

2.4 Mining Operation

Prior to surface disturbing activities, growth media will be salvaged and placed in a stockpile. Limestone ore will be extracted from the quarries, and overburden will be placed in overburden/fines piles. Fines from the crushing and screening process will be deposited in the overburden/fines piles. Quantities of material extracted from the quarries and placed in stockpiles are summarized in Table 2-2.

Table 2-3: Estimated Component Capacity Summary

Component	Ore (M tons)	Waste (M tons)	Volume (M cy)	Crest Elevation (ft amsl)	Height (ft)	Area (acres)
Big Sage North Quarry Area	17	4	n/a	6,040	560	116.8
Big Sage South Quarry Area	50	21	n/a	6,200	620	279.5
North Overburden/Fines Pile	n/a	n/a	0.5	5,800	100	22.9
Central Overburden/Fines Pile	n/a	n/a	11.2	5,960	300	96.4
Topsoil Stockpile	n/a	n/a	0.49~~3~~	5,720	16~~2~~0	17.2
Total	67	25	12.19~~3~~	n/a	n/a	532.8

2.4.1 Quarries

Based on the current knowledge of the limestone deposit, conventional bench type mining methods similar to those currently used at the Flat Iron and Allsop quarries will be used to extract limestone and overburden. Drilling and blasting will be used to break the rock, and the limestone will be loaded into haul trucks with a front-end loader and transported to the crusher. Overburden will be sent to either the North or Central overburden/fines piles. The quarry will operate 24 hours per day, seven days per week.

Quarry design will be based on Graymont's experience at the existing Poison Mountain, Flat Iron, and Allsop quarries as well as on surface mining industry standards. Benches will be developed to ensure maximum recovery of limestone. Bench faces in the quarries will typically be 20 feet to 40 feet high, and minimum bench width will be about 25 feet but will typically be much wider. Minimum bench width is dictated by equipment operating requirements. Benches will be maintained at safe operating width to allow access, where needed. Bench face angles will typically be vertical. Quarry slopes will be constructed roughly parallel to the strike of the deposit and will be up to 620 feet high.

The Big Sage North Quarry Area will have a crest elevation of 6,040 feet amsl and a quarry floor of 5,480 feet amsl. The Big Sage South Quarry Area will have a crest elevation of 6,200 feet amsl and a quarry floor of 5,580 feet amsl.

Safety ~~B~~berms will be constructed with rock from the quarries to restrict access to quarry slopes that may occur due to mining. Safety ~~B~~berms will be constructed in accordance with MSHA regulations.

As presently planned, the mining sequence will begin with the North Quarry and then move to the South Quarry. The mining sequence is subject to change based on future company production requirements.

The Big Sage Project is shown on Figure 3. As presently planned, the Permit Area contains ~~quarries will disturb approximately 391.7 acres~~396.3 acres for the quarries, which includes 274.8 acres of quarry disturbance and 121.5 acres of buffer zone around the quarry perimeters. Up to 33 percent (40 acres) of the buffer zone for the quarries is anticipated to be disturbed as part of mine operations. The elevation of the existing surface ranges from about 5,480 to about 6,180 feet above mean sea level (amsl). Approximately 70 million tons of limestone and 25 million tons of overburden will be excavated. Over the projected life of 20 to 25 years, approximately 16 million tons of fines will be produced from crushing at the Big Sage Project.

2.4.2 Slope Stability

Mining at the Big Sage quarries is anticipated to be within the massive Dome Limestone and is not expected to expose any formations identified as unstable. If quarrying intercepts unstable formations, slope stability will be evaluated, and the quarry design will be altered, as necessary. The quarried formation has shown to be competent, which is indicated by previous mining experience, natural cliffs in excess of one hundred feet high, and absence of talus slopes at the base of the cliffs within the ~~Project Area~~Permit Area. Currently, no unstable interbeds or problematic joint sets have been identified within the Dome Limestone in the Big Sage Quarry Area. However, if any problematic joint sets are recognized during quarrying, the joint sets will be evaluated for effect on slope stability.

Mapped normal faults in the Big Sage quarries commonly dip moderately to steeply to the northwest and are nearly perpendicular to the quarry slope. Therefore, the faults do not present substantive risk to slope stability. Unmapped faults identified during quarrying will be evaluated and mitigated, as necessary.

No highwalls, slopes exceeding 45 degrees and not including quarry benches, are anticipated at the Big Sage quarries during operation or after reclamation. Slopes for the Big Sage quarries were designed on the basis of bedding orientation and economic cutoff for overburden. The quarry slope along the footwall will be approximately parallel to the bedding orientation, which generally ranges from 15 to 20 degrees. Where the hanging wall thickness exceeds the economic cutoff, the slope will be mined at approximately 45 degrees. Bedding planes intersecting the hanging wall slope are expected to be stable due to the shallow dip.

The overall maximum quarry height is anticipated to be about 620 feet. As the geology is consistent throughout the entire mining area, no problematic complex slope geometry is expected.

Drilling in the Big Sage quarries has shown that groundwater is at least 280 feet below the base of the planned excavation and is not expected to have any adverse effect on slope stability. The actual groundwater depth has not been measured in the Big Sage Area. An exploration hole was drilled to a depth of 360 feet on the east side of the Facility Area, and water was not encountered. The hole was drilled May 5, 1997. Also, none of the other 76 drill holes in the ~~project area~~ Permit Area encountered water.

Previous experience at the Cricket Mountain quarries indicates that the mined limestone is very stable, and no large-mass stability safety issues within the quarry have been noted since the beginning of operations in 1981. The other quarries at Cricket Mountain have similar slope angles and heights as the Big Sage quarries. The configuration of the other quarries is analogous in regards to spatial relation of geology (i.e. bedding orientation, faults, and stratigraphic units) and therefore provides a good comparison with the planned Big Sage quarries.

Rockfalls and back-break will be reduced and managed by continuing to refine blasting designs and methods. Bench heights have been defined in order to allow equipment to work safely. However, if rockfall becomes a safety concern, mitigation measures will be taken, which may include bench scaling or avoidance.

The quarries will be regularly monitored for any signs of instability, such as significant raveling or fault exposure, and the quarries will be managed in accordance with MSHA safety guidelines and the Big Sage Project operations and reclamation plan. Quarry slopes and benches will be regularly monitored by quarry crews, supervisors, and when required, mining engineers.

2.4.3 Overburden/Fines Piles

Up to 41 million tons of overburden and fines will be stored in either the North Overburden/Fines Pile, the Central Overburden/Fines Pile, or in mined-out areas of the quarry. Prior to end-dumping overburden on the piles, growth media will be salvaged and stockpiled where practical and safe. No sulfide minerals have been identified in any of the materials to be excavated.

The overburden/fines piles will be constructed by end-dumping in lifts in valleys or on hillsides, and the piles will be utilized concurrently. The piles will either be built in single lifts or with lifts approximately 40 feet high offset by benches approximately 20 feet wide. Constructed slopes of the overburden/fines piles will be 35 degrees or less. The piles will be accessed via benches, which will be maintained at safe operating width to allow access, where needed. Access points will be rerouted or modified as mining progresses to provide for safe equipment access. Figure 5 presents conceptual overburden/fines piles cross-sections.

Dumped overburden is not a source of rockfall. Overburden/fines piles are well drained, and much of the material is coarse, providing for greater stability.

The Permit Area includes 119.3 acres for the overburden/fines piles, which includes 98.2 acres of disturbance from the overburden/fines piles and 21.1 acres of buffer zone around the overburden/fines piles perimeters. Up to 33 percent (seven acres) of the buffer zone for the overburden/fines piles is anticipated to be disturbed as part of mine operations.

The areas between the quarry and the overburden/fines piles are illustrated in Figure 5. Due to the relationship of the overburden/fines piles configurations with the quarry configurations shown in Figure 5 as well as shallow slopes (35 degrees or less for the overburden/fines piles and less than 45 degrees for the quarry slopes), the areas between the overburden/fines piles and the quarry will be stable.

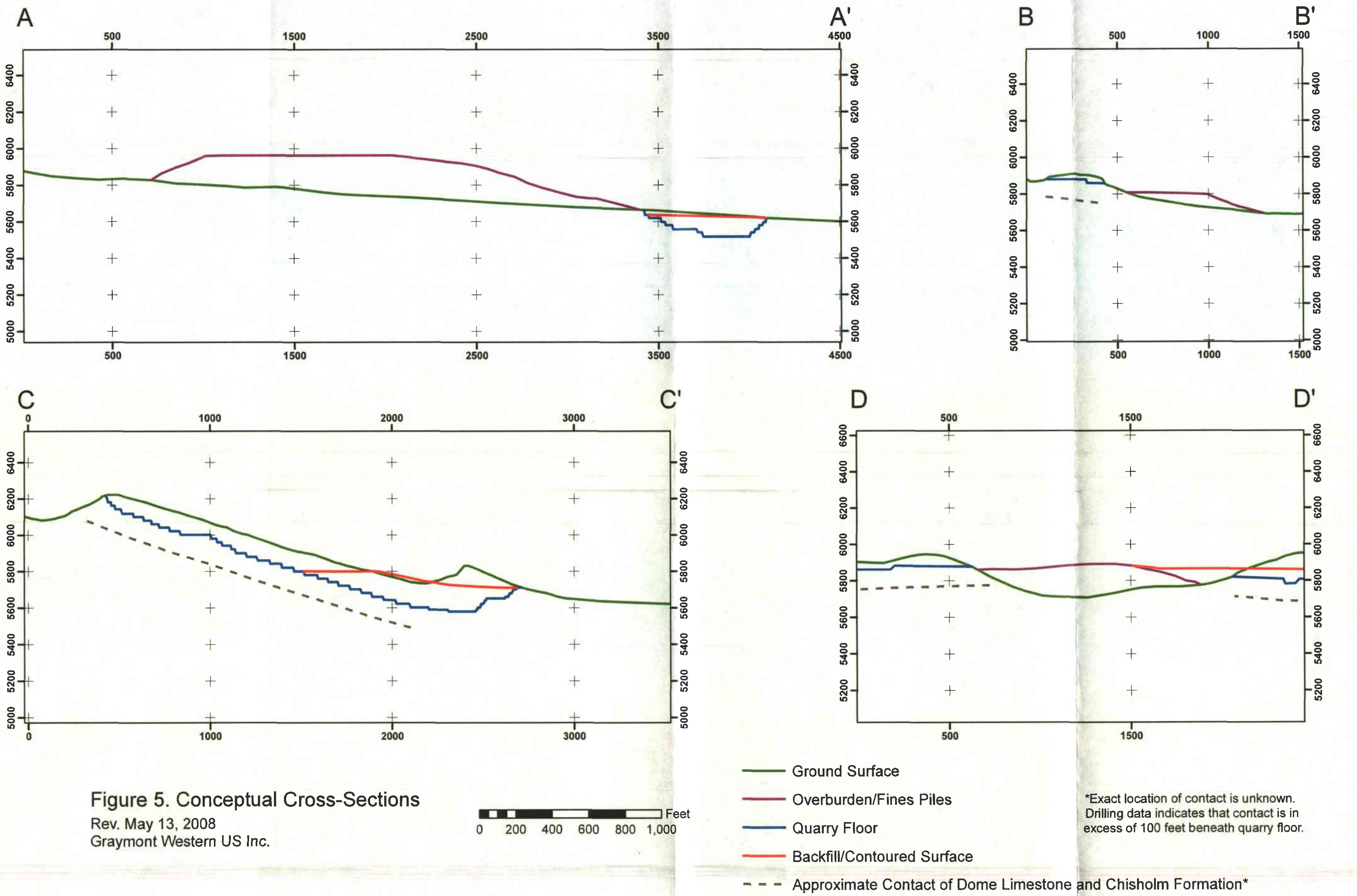

Figure 5. Conceptual Cross-Sections

Rev. May 13, 2008

Graymont Western US Inc.

Overburden/fines piles have been constructed at angle of repose at other Cricket Mountain quarries, and these piles have been stable. The overburden/fines piles at Big Sage will be constructed in a similar manner to overburden/fines piles at other Cricket Mountain quarries and are expected to be stable.

Overburden/fines piles will be visually monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective. During reclamation, sloped surfaces having the potential to experience accelerated erosion will be contour furrowed, if necessary.

The Central Overburden/Fines Pile will be constructed over an existing ephemeral drainage. Some puddles may form briefly on the top of or on the west side of the Central Overburden/Fines piles, but any collected runoff will either infiltrate or evaporate and may be beneficial for revegetation. Overburden/fines piles are well drained, as much of the material placed on the piles is coarse, as shown in Table 2-4. Coarse overburden material is placed in the existing drainage channel at the base of the overburden/fines pile. Actual water input from the ephemeral drainage covered by the Central Overburden/Fines Pile is minimal due to contributing watershed (figures~~Figure~~ 7 and 7b) and low precipitation levels (Tables 2-5, 2-6, and 3-1); therefore, the overburden/fines pile is not expected to cause a significant water impoundment. The calculations that indicate the Central Overburden/Fines Piles does not create a significant water impoundment are provided in Appendix A.

Table 2-~~44~~3: Size Distribution of Coarse Material in Overburden/Fines Piles

Size (Inches)	Percent Passing
36	100.0
20	70.0
16	61.0
14	56.0
12	52.0
10	46.0
8	41.0
6	34.0
5	30.5
4	26.7
3	22.5
2	17.7
1	12.0

The drainage in the toe of the North Overburden/Fines Pile is within the buffer area of the pile and is not expected to be disturbed; however, a diversion will be constructed, if necessary.

2.4.4 Limestone Crushing and Screening

Crushers and screens will be used to crush and screen limestone hauled from the Big Sage quarries to a nominal size of minus 2½ inches by plus 3/16 inch. Current processing plans do not include the use of processing chemicals at the Big Sage Project. Crushed and screened limestone will be stockpiled near the crushers and screeners and/or hauled to the ~~existing Cricket Mountain Plant approximately seven miles east of the Big Sage Project~~processing plant. There are no current plans to haul limestone to the Poison Mountain facilities; however, transporting limestone to the Poison Mountain facilities may be a possibility in the future.

2.4.5 Fines Stockpiles

Screen undersize material (fines) will be temporarily stockpiled within the Facility Area footprint for later transport to the North or Central overburden/fines piles as shown in Figure 3.

2.4.6 Roads

Graymont has been granted an easement (#1246) by Utah School and Institutional Trust Lands Administration (SITLA) for the sections of the Big Sage Access Road that cross state lands. A right-of-way approval, which includes BLM land along the alignment, is pending. The access road will be approximately 120 feet wide, which includes an improved dirt road, safety berms, ditches, and a utility corridor containing a power line and a buried water line. To allow for cut and fill in culvert areas, a section of the access road will be up to 200 feet wide. Access road construction will utilize cut and fill methods. The access road will be maintained in accordance with existing authorizations.

The Big Sage Access Road will be used as access to the ~~Project Area~~Permit Area by light vehicle traffic, mining equipment, and transport trucks to move crushed and screened limestone from the ~~Project Area~~Permit Area to nearby processing facilities ~~to the Cricket Mountain Plan~~. Crushed limestone will be hauled by transport trucks of up to about 110-ton capacity on a schedule of seven days per week. The production schedules require up to 214,000 tons per month of crushed limestone hauled to ~~the plant~~nearby processing facilities, which may require up to 82 truckloads per day. An existing road along the eastern project boundary may be removed or re-routed. Appropriate physical barriers and signage will be erected to prevent unauthorized access to the ~~Project Area~~Permit Area.

As shown in Figure 3, a road will be constructed between the Big Sage Access Road and the truck filling route located within the Facility Area, and a haul road will be constructed between the Facility Area and the west side of the Big Sage South Quarry Area. Running widths will be approximately 80 feet, and disturbance widths will be approximately 100 feet but may vary with topography to accommodate cut and fill construction.

Interior roads within the quarry areas and the Facility Area will be constructed for access between facilities and include a truck filling route as shown in Figure 3. Interior roads will have disturbance widths of up to 100 feet, which will include safety berms, ditches, and cut and fill construction. The length of interior roads is approximately 6,650 feet.

Haul roads and interior roads will be constructed to safely accommodate haul trucks and to meet Mine Safety and Health Administration (MSHA) requirements. Disturbance widths will include safety berms on the outside edges and internal drainage ditches, where necessary, and culverts or swales will be constructed across drainage crossings. Four 36-inch diameter culverts are anticipated where roads cross drainages.

2.4.7 Soil Stockpiles

Salvageable soil, including surface vegetation, will be removed and stockpiled within the areas planned for disturbance. Suitable soil material will be removed, where practical, so as to be available for reclamation. Salvageable soil is defined as any surface material that is presently supporting plant growth. Past experience at Cricket Mountain indicates that the practical minimum thickness for salvageable soil is six inches. Graymont will use equipment from the on-site fleet to salvage topsoil; this equipment will include but not be limited to D8-class dozers, loaders, and haul trucks.

Graymont estimates that approximately ~~431,880~~479,070 cubic yards of soil will be salvaged from the disturbance areas. However, the total volume may change depending upon the actual conditions encountered during operations.

Following stripping, soil will be stored in the topsoil stockpile with a maximum height of approximately 1~~6~~20 feet and a maximum angle between 35 and 38 degrees as shown on Figure 3. The stockpile will be contoured to minimize wind erosion~~,~~ and revegetated with the ~~interim seed mix used on the existing Poison Mountain soil stockpiles~~ approved reclamation seed mix. Signs will be posted to prevent disturbance to the soil stockpiles. Some of the planned disturbance areas are heavily infested with cheatgrass. Graymont will place the top few inches of stockpiled soil on the bottom of the pile, and evaluate treating the stockpiled soil with an herbicide to reduce the spread of cheatgrass. Soil stockpiles will be seeded the first fall after the soil is salvaged.

The topsoil stockpile will be constructed over an existing ephemeral drainage. To divert storm water runon around the topsoil stockpile, stormwater berms and diversions will be constructed between the quarry area and the topsoil stockpile as shown in ~~F~~figures 6 and 7. Storm water will flow around the topsoil stockpile and into natural drainages. Storm water ~~B~~berm dimensions will vary with topography; however, conceptual dimensions are approximately three feet high with side slopes of 2H:1V and crest widths of one foot. Conceptual storm water berm design configuration is provided in Appendix A.

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2.4.8 Buildings and Yards

As shown in Figure 6, the Facility Area includes a warehouse, a maintenance shop, a first aid room, an office, a lunch room, a truck washing station, three water tanks, a fuel tank, ANFO storage, a primary crusher, a secondary crusher, conveyors, screens, limestone stockpiles, a fines stockpile, and interior roads. Undisturbed "islands" of vegetation may remain between the buildings and interior roads~~; however, for bonding purposes the entire area will be assumed disturbed~~. Acreage associated with interior roads ~~will be~~is bonded as roads, and the remaining acreage ~~will be~~is bonded as yards.

At the truck washing station, a catch basin and oil sump will be constructed to collect oil washed from the vehicles. Gray water from the washing station will be evaporated in the catch basin, and separated oil will be collected and removed by a licensed contractor.

Prior to building construction, the area will be cleared, grubbed, and leveled. ~~Fill~~ Limestone fines~~material~~ will be used to establish a level surface..

2.4.9 Water Supply

An existing well, shown in Figure 2, ~~near the Cricket Mountain Plant~~ currently supplies water for the mining operations and processing facilities. Water use associated with the mining operations is generally limited to dust control on roads and disturbed areas as well as during drilling, crushing, and screening operations.

Water will be trucked or piped from the ~~Cricket Mountain Plant~~existing well to the Big Sage Project and will be stored in water tanks for use in dust control on roads and for drilling and crushing operations. Water tanks will have a nominal 20,000 gallon capacity. As shown in Figure 6, three water tanks will be located within the following areas: Big Sage North or South Quarry Area footprint, next to the maintenance shop, and near the primary crusher. The increased production associated with the Big Sage Project may increase water needs for the mining operations; however, the existing well production is expected to be sufficient for meeting water needs.

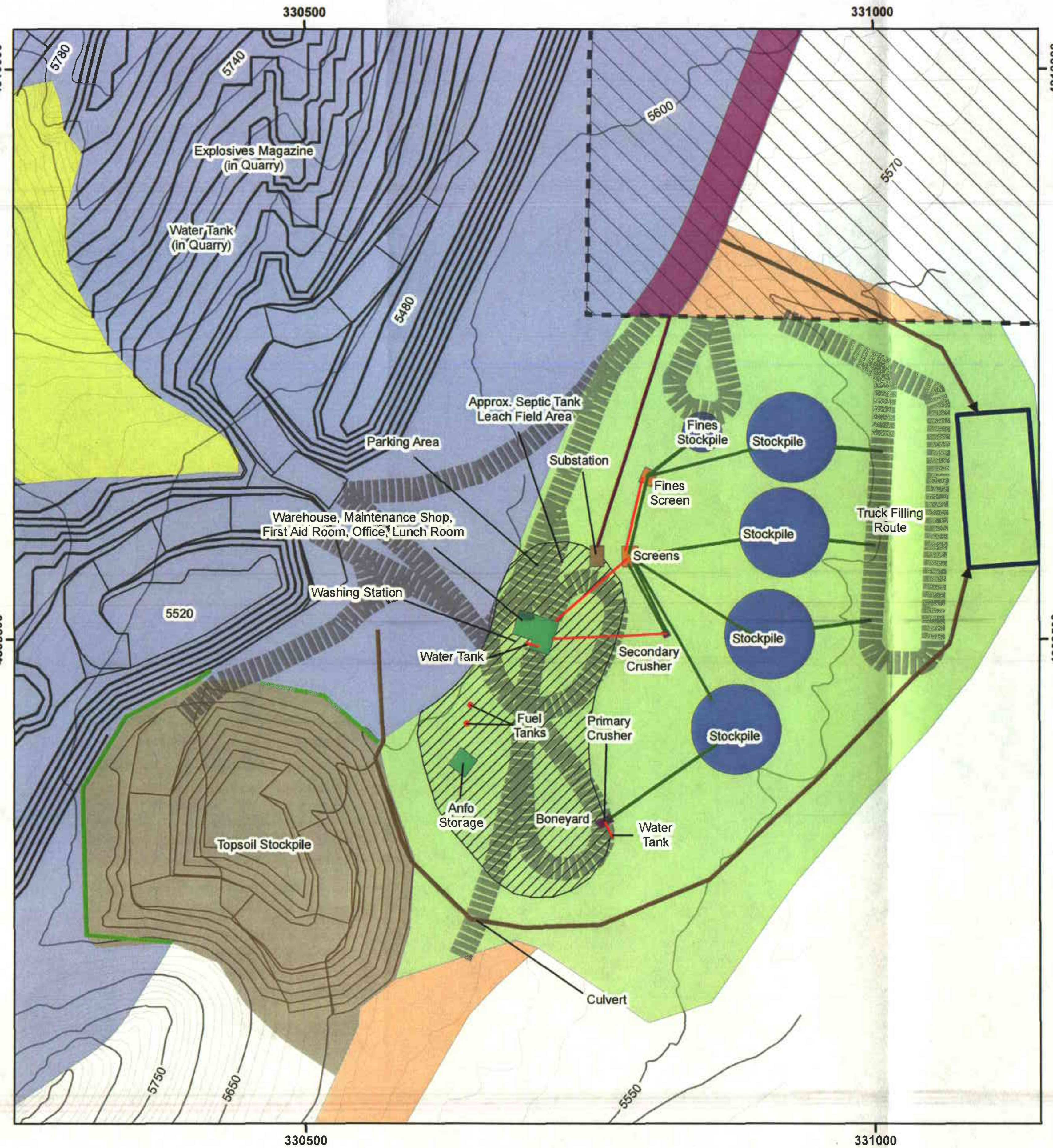

Figure 6. Big Sage Conceptual Facility Layout

-Base Topographic Contours are 10 Feet
-Quarry Topographic Contours are 20 Feet
-Topsoil Stockpile Contours are 20 Feet
-Coordinate system is UTM Zone 12N (NAD27)

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Legend

Facilities

- Buildings
- Stockpiles
- Crushers
- Screens
- Tanks
- Substation
- Conveyors
- Leveled Area
- Powerline
- Water Pipelines

Stormwater Management Measures

- Stormwater Berm
- Diversion Ditch
- Evaporation Pond

- Graymont Fee Land Boundary
- Graymont State Lease
- SITLA Easement
- Conceptual Pit Topography
- Conceptual Topsoil Stockpile Topography
- Interior Roads

Big Sage Bonded Areas

- Quarry Areas
- Overburden/Fines Piles
- Facility Area
- Topsoil Stockpile
- Road Disturbance

0 100 200 300 400 500 Meters

0 200 400 600 800 1,000 Feet

N

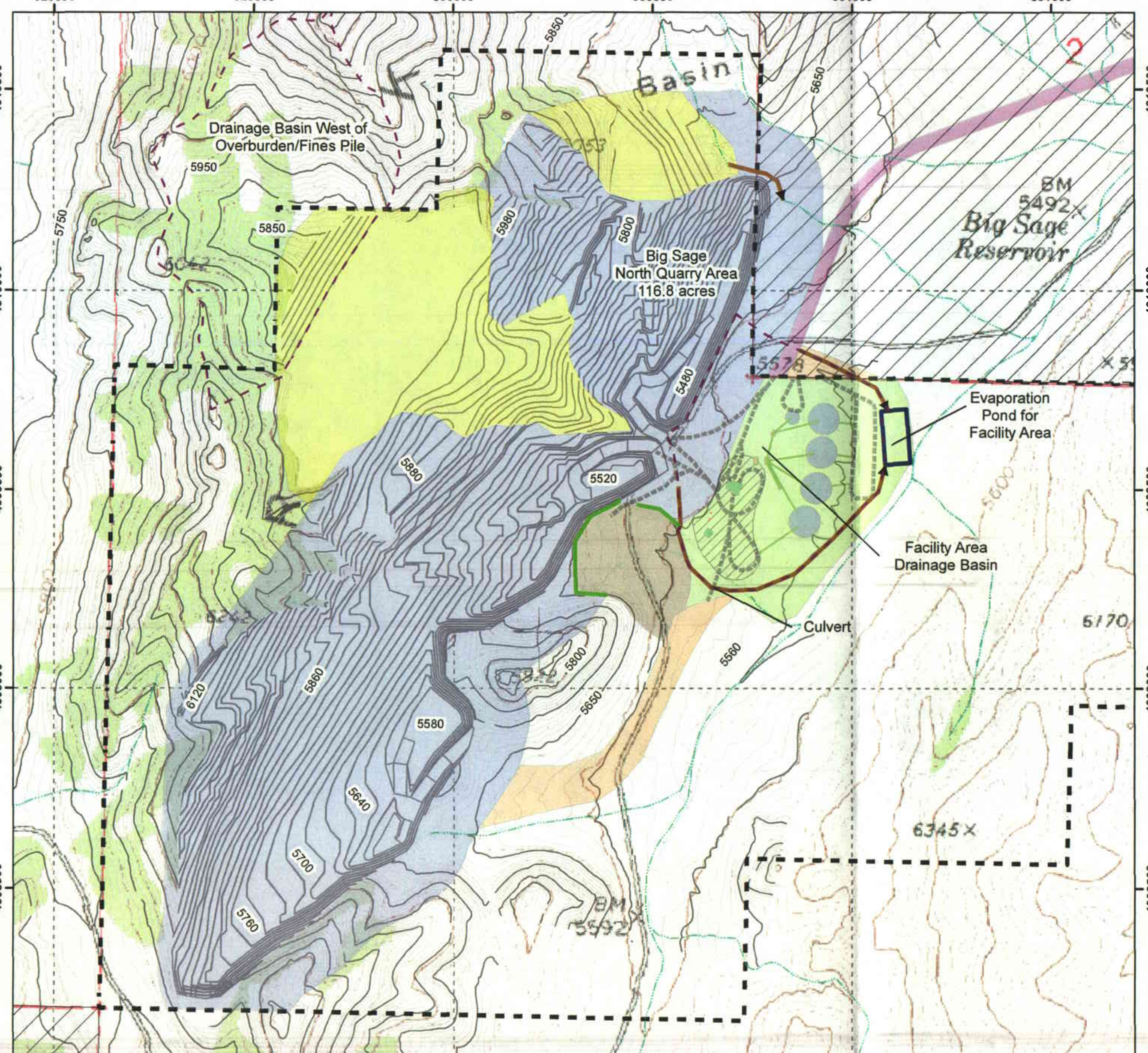

Figure 7. Conceptual Stormwater Management Map

-Surveyed Topography has 10 foot Contour Intervals
-Topographic Base is Candland Spring, UT
7.5' USGS Quadrangle 40 foot Contour Intervals
-Quarry and Overburden/Fines Topography
has 20 foot Contour Intervals
-Coordinate system is UTM Zone 12N (NAD27)

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Graymont Fee Land
Graymont State Lease
SITLA Easement
Conceptual Pit and Overburden/Fines Pile Topography
Conceptual Interior Roads
Conceptual Drainages
Stormwater Berm
Diversion Ditch
Evaporation Pond
Drainage Basin Area

Big Sage Bonded Areas

Quarry Areas
Overburden/Fines Piles
Facility Area (see Figure 6 for more detail)
Topsoil Stockpile
Road Disturbance

0 200 400 600 800 1,000 Meters
0 500 1,000 1,500 2,000 Feet
N

2.4.10 Power Supply

Line power from the utility corridor along the Big Sage Access Road will be established at the ~~Project Area~~Permit Area. A substation will be located within the Facility Area and will have a nominal capacity of 12 kV.

2.4.11 Equipment Requirements

Graymont will employ equipment from the existing operations to mine and haul limestone from the Big Sage Project. Plans include using trucks currently working in the existing operations to haul limestone from the quarry, and loaders currently operating in existing operations will be used to load the trucks. Additional haul trucks and loaders will be added as needed to meet production demands.

2.4.12 Project Workforce

The total current workforce is 59 people, 18 of which currently work in the existing quarries. An estimated ten to 14 employees will work in the Big Sage quarries.

2.4.13 Blasting

Blasting will occur as needed to sustain production, but blasting will be limited to daylight hours. Any loose material generated from blasting that might migrate toward the edge of the quarry benches will be removed immediately.

ANFO will be stored in a designated storage area within the Facility Area footprint, and an explosives magazine will be located within the Big Sage North or South Quarry footprint. Explosives will be stored and used in accordance with Mine Safety and Health Administration (MSHA) and Bureau of Alcohol, Tobacco, and Firearm (BATF) regulations.

2.4.14 Fuel Storage and Use

Diesel fuel and gasoline will be stored in above ground tanks near the maintenance shop. The tanks will be installed on concrete pads and surrounded by concrete berms to contain leaks, spills, or ruptures of the tanks. The diesel fuel tanks will have a combined capacity of 40,000 gallons, and the gasoline fuel tank will have a capacity of 500 gallons. Oil will be stored inside a containment area within a building. Diesel fuel, gasoline, and oil will be handled in accordance with industry standards as well as state and federal regulations.

2.4.15 Sanitary and Solid Waste Disposal

A septic tank and leach field will be located near the maintenance building as shown in Figure 6. Explosives containers and packing materials will be disposed of according to manufacturer instructions. Used tires, scrap lumber, etc. will be stored in a "bone yard" within the Facility Area until disposed. Waste piles will be placed to avoid environmental impacts. Waste materials will be removed at closure and disposed of in an approved off-site landfill.

Used oil will be burned in building heaters located at ~~the Plant~~nearby facilities or picked up for disposal or recycling by a private contractor. Used containers will be disposed according to federal, state, and local regulations.

Solid waste generated by the mine and process departments will be collected in dumpsters near the point of generation. Solid waste will be shipped off-site to a local industrial landfill.

Employees will be informed of their responsibilities in proper waste disposal procedures.

2.4.16 Safety and Site Control

The Project will be permitted as a mining operation and will operate in conformance with applicable MSHA safety regulations (30 CFR 1-199) as well as in conformance with the requirements of the Utah Mined Land Reclamation Act and associated rules. The access road to the Big Sage Project ~~passes through the Cricket Mountain Plant site, which operates 24 hours per day, seven days per week. Access through the Cricket Mountain Plant site to the access road~~ is restricted to employees and authorized visitors.

Warning signs will be placed where quarry slopes are located as well as at entrance locations to the Facility Area. Warning signs will be in a location that is visible from more than one viewpoint, and multiple signs will be placed in areas where signage will not be visible from more than one viewpoint. Warning signs will be easy to read and easy to understand.

2.4.17 Storm Water Management

Rain water or snowmelt in the quarries either soaks into the ground or forms puddles on the quarry floor. The puddles either evaporate or soak into the ground. The quarry floors will be relatively flat and will be gently sloped to prevent storm water from leaving the quarry areas. In addition, storm water berms will be constructed along the outer edge of the quarry floors, which will prevent storm water from leaving the quarry areas.

The quarry haul roads are protected on both sides by safety berms. Under certain rainfall conditions, storm water will travel along the safety berms to ~~designated~~ temporary catch basins that are located onsite. The water that collects in the catch basins or other areas either soaks into the ground or evaporates. No storm water is discharged off the property from the catch basins or haul roads within the quarry areas.

Overburden/fines piles and the topsoil stockpile will be constructed to control runoff. Overburden/fines piles will be visually monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective. During reclamation, sloped surfaces having the potential to experience accelerated erosion will be contour furrowed, if necessary.

The Central Overburden/Fines Pile will be constructed over an existing ephemeral drainage. Some puddles may form briefly on the top or on the west side of the Central Overburden/Fines Pile, but any collected runoff will either infiltrate or evaporate and may be beneficial for revegetation. Overburden/fines piles are well drained, as much of the material placed on the piles is coarse as shown in Table 2-3. Coarse overburden material is placed in the existing drainage channel at the base of the overburden/fines piles. ~~due to the nature of the coarse material placed on the piles.~~ Actual water input from the ephemeral drainage covered by the Central Overburden/Fines Pile is minimal due to contributing watershed (f~~F~~igures 7 and 7b) and low precipitation levels (Tables 2-5, 2-6, and 3-1); therefore, the overburden/fines pile is not expected to cause a significant water impoundment. The calculations that indicate the Central Overburden/Fines Piles does not create a significant water impoundment are provided in Appendix A.

The drainage in the toe of the North Overburden/Fines Pile is within the buffer area of the pile and is not expected to be disturbed; however, a diversion will be constructed, if necessary.

The topsoil stockpile will be constructed over an existing ephemeral drainage. To divert storm water runon around the topsoil stockpile, storm water berms and diversions will be constructed. The storm water berms will be constructed between the quarry area and the topsoil stockpile. A~~, and a~~ctual dimensions may vary with topography; however, c~~-~~onceptual storm water berm dimensions are approximately three feet high with side slopes of 2H:1V and crest widths of one foot. Conceptual storm water berm design configuration is provided in Appendix A, and ~~C~~conceptual storm water berm and diversion locations are shown in ~~F~~figures 6 and 7.

Storm water diversion ditches will be constructed down gradient of the Facility Area as shown in Figure 7. Flow from the ditch will be collected in an ~~evaporation pond~~storm water retention pond to prevent discharge from the ~~Project Area~~Permit Area. Diversions and the ~~evaporation pond~~storm water retention pond will be designed to handle the 25-year, 24-hour storm event; diversion ditch dimensions will vary with topography and watershed size. Figure 7b shows the hydrologic sub-basin boundaries, and Appendix A presents the storm water retention pond sizing calculations.

Surface waters will be managed to avoid ~~excessive~~ sediment loading to runoff outside of the ~~Project Area~~Permit Area. No jurisdictional waters will be affected by quarry and support operations. Additional storm water management details are provided in the Storm Water Pollution Prevention Plan located in Appendix A.

Climatological data collected at the Deseret weather station and representative of the Big Sage Project are presented in Table 2-4~~3~~. The monthly and annual average information is based on data collected from August 1891 to June 2007 (period of record) as obtained from the Western Regional Climate Center (WRCC) database. The WRCC database includes precipitation and temperature data extracted from the Deseret station, which is located approximately 30 miles from the Big Sage Project at an approximate elevation of 4,590 feet above mean sea level (amsl).

Table 2-55~~3~~: Summary of Climatological Data for the Big Sage Project

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Precipitation (in.)	Average Total SnowFall (in.)
January	38.5	13.2	0.56	4.2
February	45.4	18.9	0.60	3.5
March	55.8	25.3	0.77	2.9
April	64.9	31.8	0.88	1.5
May	74.4	39.8	0.92	0.3
June	84.9	47.2	0.43	0.0
July	93.0	55.1	0.46	0.0
August	90.7	53.4	0.60	0.0
September	81.1	42.8	0.61	0.1
October	68.1	31.9	0.78	0.3
November	52.5	21.8	0.59	1.9
December	40.1	14.5	0.57	3.5
Annual	65.8	33.0	7.76	18.2

Source: Western Regional Climate Center, Deseret Station (422101)

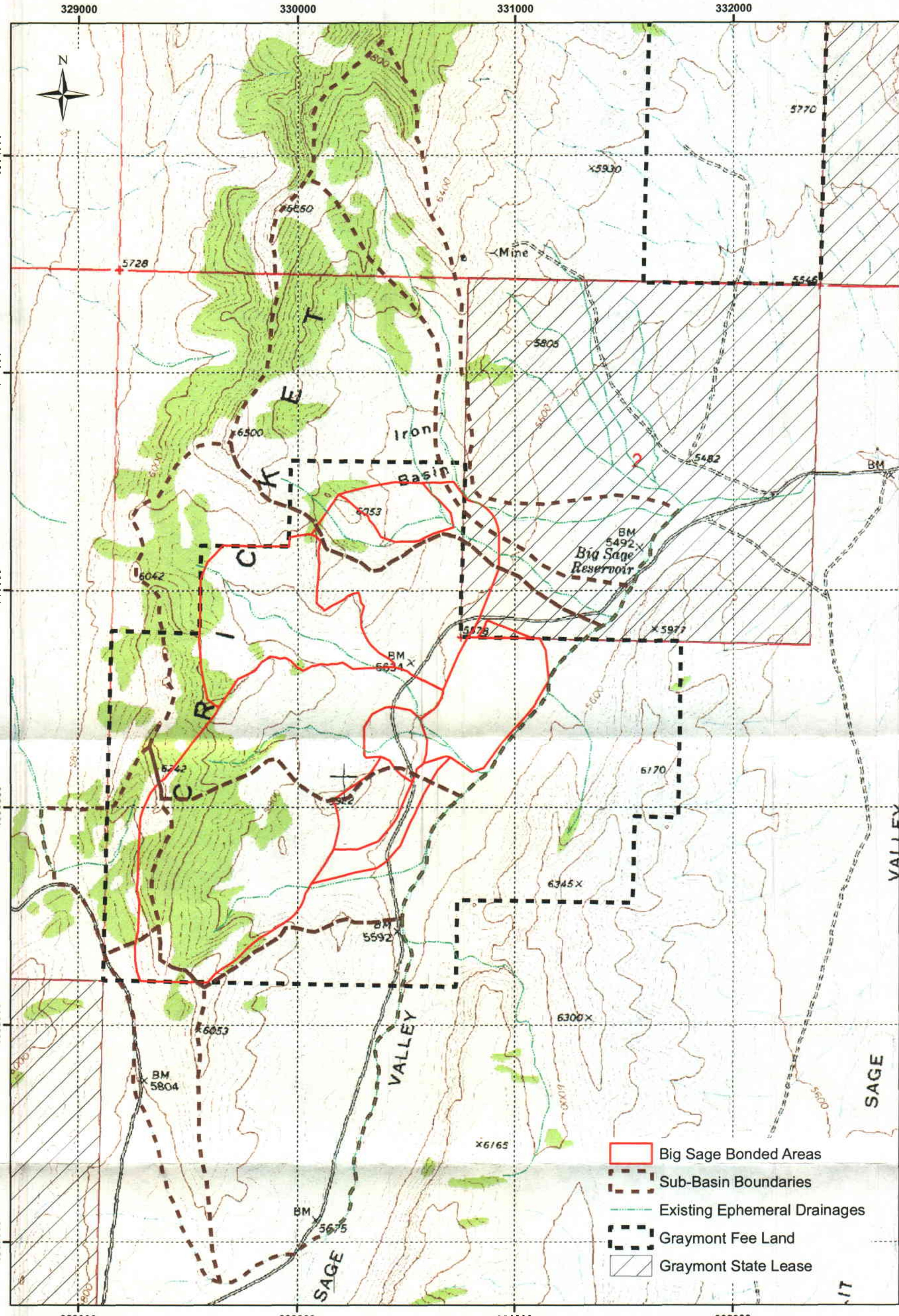

Figure 7b. Sub-Basin Boundary Map

-Topographic Base is Candland Spring, UT 7.5' USGS Quadrangle 40 foot Contour Intervals
-Coordinate system is UTM Zone 12N (NAD27)

Meters
0 200 400 600 800 1,000

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Storm event data for the Big Sage Project were evaluated based on the *Precipitation-Frequency Atlas of the United States*, Atlas 14, Volume 1, Version 4 from the National Oceanic and Atmospheric Administration (NOAA). Point precipitation frequency estimates from the Atlas were selected based on the Big Sage Project location of 38.92° N, 112.957° W. The 24-hour storm events with recurrence intervals of 10, 25, and 100 years are provided in Table 2-5~~4~~.

Table 2-664: Storm Event Data for the Big Sage Project

Frequency/Duration	Precipitation	Source
10-Year/24-Hour	1.95 inches	NOAA Atlas 14, vol. 1, v.4
25-Year/24-Hour	2.31 inches	NOAA Atlas 14, vol.1, v.4
100-Year/24-Hour	2.88 inches	NOAA Atlas 14, vol.1, v.4

2.4.18 Erosion and Sediment Control

Best Management Practices (BMPs) will be used to limit erosion and reduce sediment in precipitation runoff from Project components and disturbed areas during construction and operations. BMPs may include, but are not limited to: straw bale sediment traps, diversion ditches, and rock and gravel cover. Straw bales will be used in areas where temporary erosion and sediment control measures are installed while rock and gravel cover will be utilized on permanent erosion and sediment control features. Vegetation is also a BMP and may be used as a cover to reduce the potential for wind and water erosion. Following construction activities, identified areas will be seeded as soon as practical and safe.

Sediments containing deleterious materials have not been identified and are not expected to exist at the Big Sage Project. Material that will be excavated in the quarry areas is of typical carbonate composition, and the major constituents are calcite, dolomite, and silica.

Any sediment and erosion control measures will be visually inspected annually or as soon as practicable following large storm or runoff events. Maintenance will occur on a regular basis and repairs performed as needed.

2.4.19 Emission Control

Methods for controlling dust are specified in the *Dust Control Plan* and the air quality permit (operating permit #2700004001), which are~~is~~ for the Cricket Mountain Project and will be modified to include the Big Sage Project. The *Dust Control Plan* and air quality approval order are provided in Appendix B.

Water application with the use of a water truck will be the primary method of dust suppression on haul roads and disturbed areas of the site. Speed limitations will also be employed for the haul roads. A chemical dust suppressant, such as magnesium chloride or calcium chloride, will be applied to the access and haul roads at intervals specified in the air quality permit. Any chemicals utilized for dust control will be handled in accordance with industry standards and applicable state and federal regulations. If practical, disturbed areas will be revegetated on an interim basis to minimize exposed surfaces.

2.4.20 Concurrent Reclamation

Concurrent reclamation reduces erosion, provides early impact mitigation and reduces final reclamation work. Graymont intends to optimize the amount of concurrent reclamation at the site. This will allow larger-scale testing of grading, reclamation cover placement, and revegetation techniques. After storm events, project components will be inspected and evaluated to ensure that the components are maintained in an environmentally sound manner.

Overburden/fines piles will be utilized concurrently.

2.4.21 Cultural Resources

Class III cultural resources inventory surveys have been performed for the disturbance areas. Available survey results are located in Appendix ~~B~~C. Sites that may be considered potentially eligible for the National Register of Historic Places will either be avoided or mitigated in accordance with Section 106 procedures. If construction or mining activities uncover human remains, Graymont will follow procedures described in the Native American Graves Protection and Repatriation Act.

2.4.22 Wildlife

In April 2007, a raptor survey was conducted (SRK 2007a). Raptor nests located within the Big Sage ~~Project Area~~Permit Area did not have any fresh material to indicate use during 2007. The results of the survey are located in Appendix ~~B~~C. Because no active raptor nests have been identified in or near the ~~Project Area~~Permit Area, Graymont will not need to implement procedures to mitigate or avoid direct impact to these nests prior to the beginning of construction.

Surveys for special status species of plants and animals have been conducted for the disturbance areas, and survey results are located in Appendix ~~B~~C. Graymont will not be required to implement procedures to mitigate or avoid direct impact to special status species in or near the ~~Project Area~~Permit Area prior to initiation of construction because none were identified.

3. Impact Assessment

Rule R647-4-109 of the UDOGM Minerals Program requires the preparation of an impact assessment identifying potential surface and/or subsurface impacts. An EA was completed for the Cricket Mountain Project in April 1996 (BLM 1996). This environmental assessment can provide additional context for the impact assessment section of this revision.

3.1 Surface and Ground Water Resources

Surface water in the ~~Project Area~~Permit Area flows only in response to snowmelt or precipitation events. Graymont has measured precipitation at ~~the Cricket Mountain Plant~~a monitoring point located west of Highway 257 near the Bloom railroad siding in Section 36, Township 21 South (T21S), Range 9 West (R9W); precipitation measurements are summarized in Table 3-1. Graymont will install culverts and water crossings on roads as needed. BMPs will be used to control sediment to limit erosion and reduce sediment in precipitation runoff from Project components and disturbed areas during construction and operations as described in Section 2.4.18. Surface waters will be managed to avoid excessive sediment loading to runoff outside the ~~Project Area~~Permit Area. No jurisdictional waters will be affected by quarry and support operations. No impacts to surface water resources are projected beyond what is shown on Figure 7.

Table 3-1: ~~Cricket Mountain Plant Precipitation~~Precipitation at Monitoring Point Located in Section 36, T21S, R9W

Month	2000 (inches)	2001 (inches)	2002 (inches)	2003 (inches)	2004 (inches)	2005 (inches)	2006 (inches)
January	1.57	0.59	0.32	0.64	0.74	1.61	0.94
February	1.56	0.41	0.13	0.89	0.98	0.96	0.27
March	0.69	0.74	1.19	1.08	0.27	1.72	1.56
April	0.62	0.67	1.22	0.97	1.79	1.19	0.69
May	0.74	0.54	0.12	0.62	0.34	1.21	0.35
June	0.35	0.50	0.06	0.86	1.08	0.36	0.00
July	0.65	0.71	0.68	0.12	0.29	0.15	1.27
August	0.99	0.09	0.08	1.00	0.16	0.54	0.44

Month	2000 (inches)	2001 (inches)	2002 (inches)	2003 (inches)	2004 (inches)	2005 (inches)	2006 (inches)
September	0.85	0.12	0.91	0.29	0.07	0.64	0.85
October	2.35	0.50	1.38	0.14	1.55	0.87	2.36
November	1.28	0.72	0.60	0.96	0.58	0.05	0.40
December	0.42	0.78	0.12	1.11	0.89	0.91	0.41
Annual	12.07	6.37	6.81	8.68	8.74	10.21	9.54

Groundwater occurs at a depth in excess of 280 feet below ground surface. The actual groundwater depth has not been measured in the Big Sage Area. An exploration hole was drilled to a depth of 360 feet on the east side of the Facility Area, and water was not encountered. The hole was drilled May 5, 1997. Also, none of the other 76 exploratory drill holes in the ~~project area~~Permit Area encountered water. The limestone does not contain any deleterious constituents that will affect groundwater quality. Graymont will use an existing well to supply water for dust control within existing authorized water use rates.

3.2 Wildlife

Wildlife that may be found in the area include mule deer, pronghorn antelope, black-tailed jackrabbit, desert cottontail, badger, coyote, bobcat, white tail antelope squirrel, chukar partridge, Cooper's hawk, American kestrel, northern harrier, rough-legged hawk, pinyon jay, mourning dove, black-throated sparrow, bats, and horned larks (BLM 1996). Bats may inhabit caves in the upland cliffs. The cliffs overlooking the Big Sage Area also provide habitat for prairie falcons and golden eagles.

Yearlong antelope habitat covers the ~~Project Area~~Permit Area (UDWR 2004). The Utah Division of Wildlife Resources (UDWR) describes the antelope habitat as substantial, but not critical because this habitat type covers an extensive area throughout the area (BLM 1996).

Significant raptor populations occupy areas near the ~~Project Area~~Permit Area on a year-round basis (BLM 1996). The cliffs on the east side of the Big Sage Valley provide potential habitat for golden eagles and prairie falcons; however, neither species was observed during an April 2007 survey (SRK 2007a). Nests observed on the cliffs did not have any fresh material to indicate recent use (SRK 2007a). Indirect impacts will include the creation of new raptor habitat in the quarry walls. No residual impacts are projected.

The three species of upland game include chukar, sage-grouse, and ring-necked pheasant. Chukar range is located in the Cricket Mountains and falls within one half mile of the ~~Project Area~~Permit Area. Two wildlife guzzlers are located east of the ~~Project Area~~Permit Area. No active sage-grouse strutting grounds or leks are located in the ~~Project Area~~Permit Area. Ring-necked pheasant occasionally occur in the area and are likely birds expanding out of the agricultural areas to the north that have followed the weedy railroad grade to this area.

Permanent wildlife habitat within the ~~Project Area~~Permit Area is limited due to the lack of a water source (except for the two guzzlers previously mentioned). The area of disturbance does not include any special or unique habitats not found elsewhere in nearby adjacent lands. Therefore, there will be no significant impacts to wildlife.

3.3 Special Status Species

Graymont conducted a survey in 1996 in the near vicinity of the ~~Project Area~~Permit Area to identify the potential for special status species to occur. No federally-listed threatened or endangered plant species were identified at that time (BLM 1996). Sensitive plants of concern that have the potential to occur in the ~~Project Area~~Permit Area include: inch-high milkvetch (*Astragalus uncialis*), compact cateye (*Cryptantha compacta*), ibex buckwheat (*Eriogonum nummulare* var. *ammophilum*), Tunnel Springs beardstongue (*Penstemon concinnus*), and Jones globemallow (*Sphaeralcea caespitosa*) (BLM 1996). Inch-high milkvetch is known to occur at Long's Ridge about 25 miles north of the ~~Project Area~~Permit Area (BLM 1996). Compact cateye is known to occur in western Millard County near the Desert Experiment Range, and ibex buckwheat is know to occur at Sand Pass about 40 miles north of the ~~Project Area~~Permit Area (BLM 1996). Tunnel Springs beardstongue and Jones globemallow are known to occur in western Millard and Beaver Counties (BLM 1996).

None of the sensitive plants species were located during the 1996 survey after walking linear transects in prior surveys of areas of high and moderate potential habitat (BLM 1996). There was low potential habitat for inch-high milkvetch in the surrounding area and potential habitat on limestone and dolomite outcrops for Jones globemallow (BLM 1996).

A second survey conducted in August 1998 adjacent to the ~~Project Area~~Permit Area did not identify any threatened, endangered, endemic, or sensitive plants or mammal species (Mt. Nebo Scientific 1998). A more recent survey of the ~~Project Area~~Permit Area did not identify any threatened, endangered, endemic, or sensitive plants or mammal species (SRK 2007a). No direct, indirect, or residual impacts to special status species are projected to occur.

3.4 Soil Resources

Approximately ~~431,880~~479,070 cubic yards of soil will be reclaimed from undisturbed sites and stockpiled for future reclamation. Figure 8 shows the location of the soil associations that will be affected.

The stockpile will be seeded to prevent impacts from wind and water erosion. Some of the disturbance areas are heavily infested with cheatgrass. Graymont will place the top few inches of stockpiled soil on the bottom of the pile, and evaluate treating the stockpiled soil with an herbicide to reduce the spread of cheatgrass. Soil stockpiles will be seeded the first fall after the soil is salvaged. No indirect or residual impacts are anticipated to soil resources.

3.5 Slope Stability

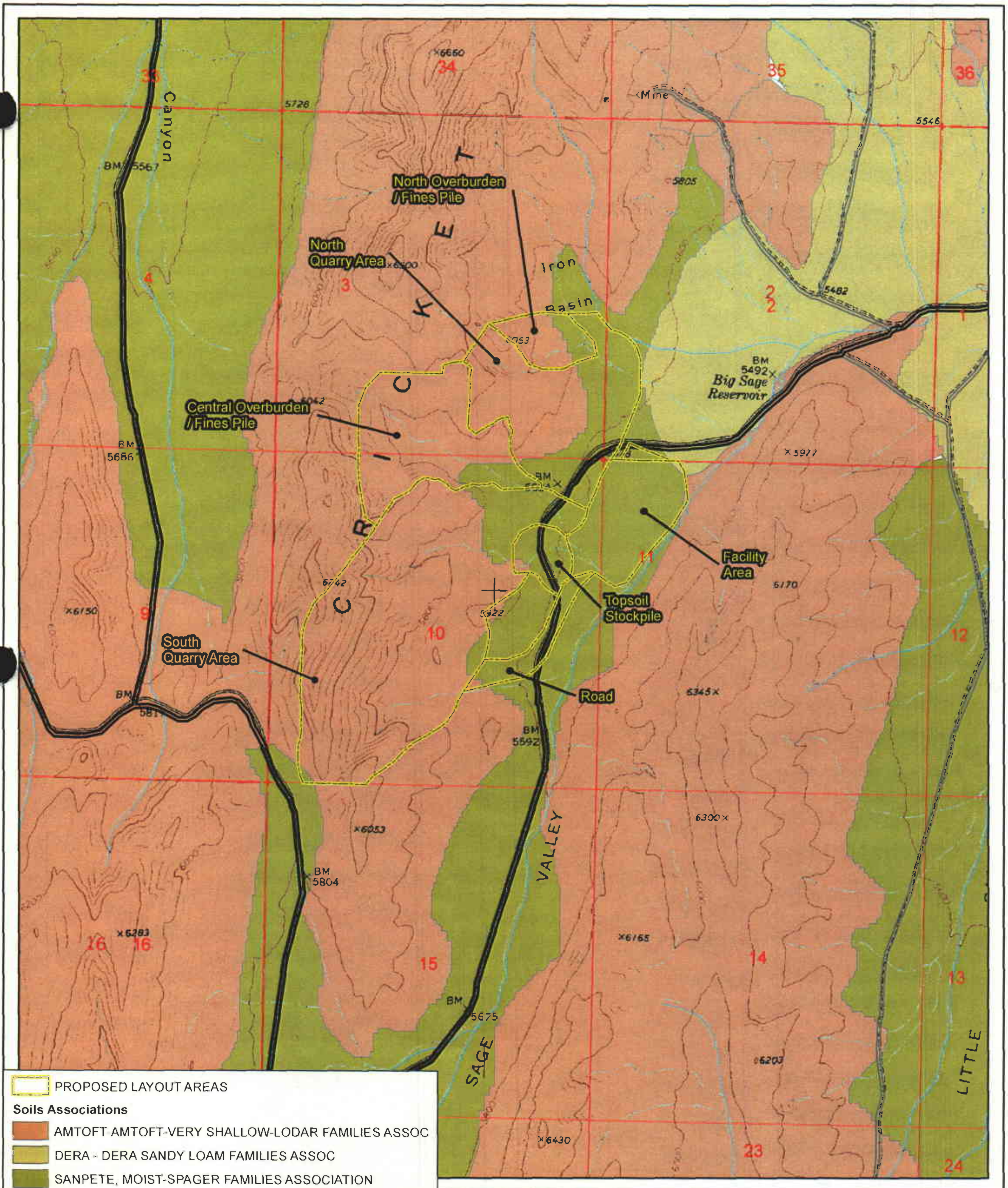
Impacts to slope stability have been considered as outlined in Section 2.4.2, and appropriate mitigation measures are in place to limit impacts as described in Section 2.4.2 and below.

Rockfalls and back-break will be reduced and managed by continuing to refine blasting designs and methods. Bench heights have been defined in order to allow equipment to work safely. However, if rockfall becomes a safety concern, mitigation measures will be taken, which may include bench scaling or avoidance.

The quarries will be regularly monitored for any signs of instability, such as significant raveling or fault exposure, and the quarries will be managed in accordance with MSHA safety guidelines and the Big Sage Project operations and reclamation plan. Quarry slopes and benches will be regularly monitored by quarry crews, supervisors, and when required, mining engineers.

3.6 Erosion Control

Due to the area climate (discussed in Section 2.4.17), area soils types (SRK, 2007b), and BMPs that will be utilized to control erosion, no impacts are anticipated from erosional processes. BMPs to control erosion are presented in Section 2.4.18.



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0 500 1,000 2,000 Feet

DESIGNED	GNB	04/10/07
DRAWN	RSS	11/5/07
CHECKED		
APPROVED		
REVISED		
REVISED		

FIGURE 8

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
BIG SAGE VALLEY AREA
SOIL ASSOCIATIONS

SRK Consulting
Engineers and Scientists

SCALE:	AS SHOWN	REVISION
JOB NO:	138406	A
MAP NAME:	NOI_Fig8_Big_Sage_Soils_RSS_20070321.mxd	

Path: G:\Sites\Cricket_Mountain\Graymont_Western\138406_000_NoI\NOI_Fig8_Big_Sage_Soils_RSS_20070321.mxd

3.7 Air Quality

Direct impacts to air quality will include the short-term increase in fugitive dust from quarrying and hauling. Graymont will use BMPs to control fugitive dust as used in the existing operations. Methods for controlling fugitive dust, such as water application or chemical dust suppressant application on roads, are specified in the air quality permit (#2700004001), which is for the Cricket Mountain Project and will be modified to include the Big Sage Project. No indirect or residual impacts are projected to occur to air quality. Roads will be maintained as described in Sections 2.4.6 and 2.4.19.

3.8 Public Health and Safety

The Project configuration inherently limits impacts to public health and safety; the Project description includes safety measures that protect public health and safety. Risks have been identified, analyzed, and managed to ameliorate environmental issues associated with this Project. As described in Section 2.4.16, public access to the mining and haul road area will be limited to authorized individuals only. Appropriate signage will be erected and maintained to alert recreationalists, atv-riders, or other public of mining activities in the area. Warning signs will be highly visible, easy to read, and easy to understand.

4. Reclamation and Closure

4.1 Introduction

Reclamation of disturbed areas resulting from activities outlined in this NOI will be completed in accordance with federal and state regulations. The Utah Mined Land Reclamation Act of 1975, Title 40, Chapter 8 of the Utah Code Annotated states that "Mined land should be reclaimed so as to prevent conditions detrimental to the general safety and welfare of the citizens of this state and to provide for the subsequent use of the lands affected" (40-8-2).

~~Reclamation and closure of the disturbance areas will be similar to that of the Cricket Mountain Mine (SRK 1996). The Cricket Mountain reclamation plan has been developed with input from UDOGM as well as BLM and has been refined based on site specific operating experience over the life of the project.~~ Reclamation and closure planning for the Big Sage Project are anticipated to be ongoing processes based on Graymont's continuing experience at the Cricket Mountain Mine and other operations.

The following subsections present a discussion of conceptual reclamation and closure of the Big Sage Project and associated roads. Conceptual reclamation is shown on Figure 9.

4.2 Land Uses

Major land uses occurring in the ~~Project Area~~Permit Area include wildlife habitat, grazing, and recreation. Following closure, the ~~Project Area~~Permit Area will continue to support wildlife habitat. Post-closure land uses are in conformance with the Millard County zoning ordinances.

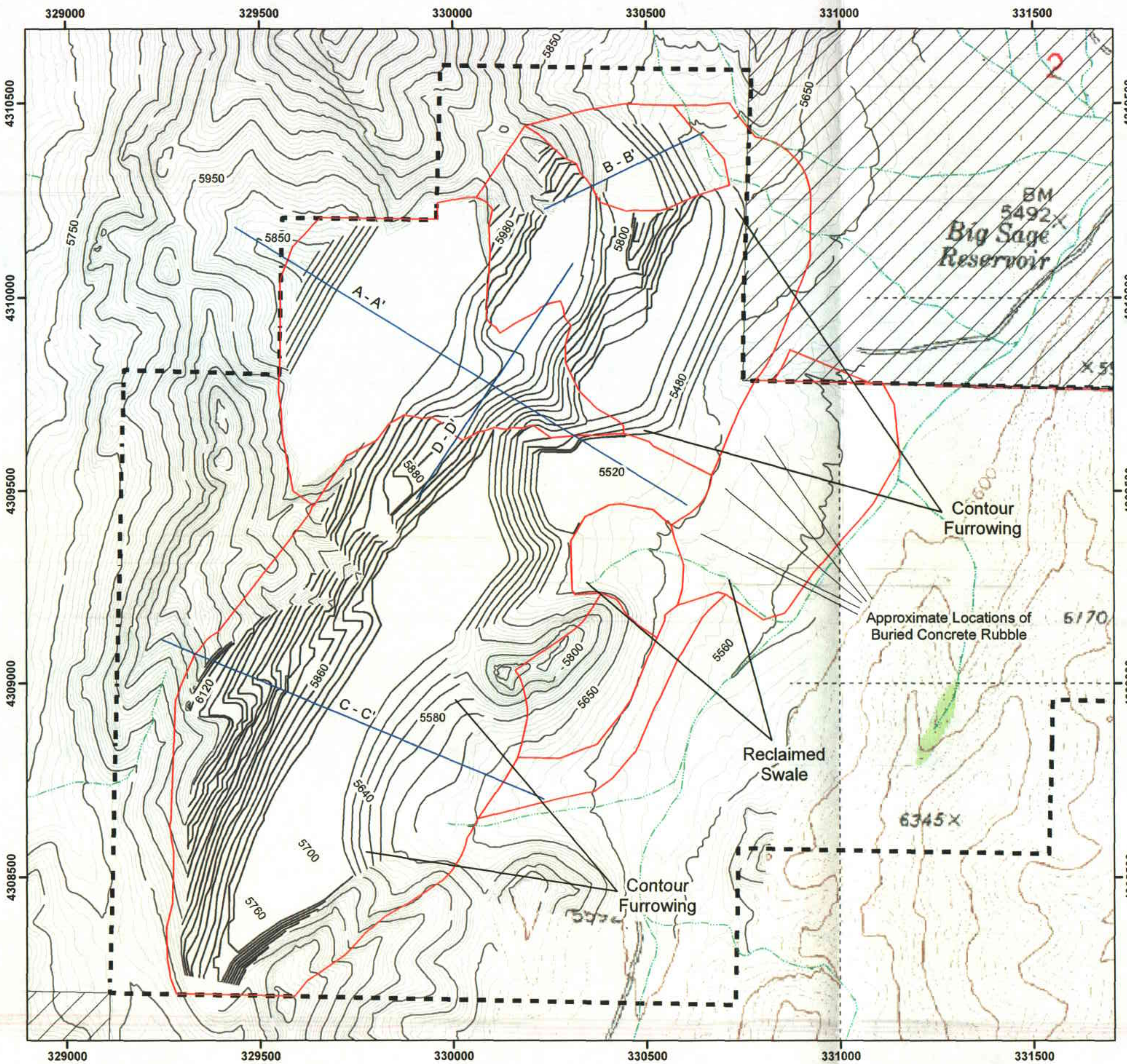

Figure 9. Conceptual Reclamation Map

-Surveyed Topography has 10 foot Contour Intervals
-Topographic Base is Candland Spring, UT
7.5' USGS Quadrangle has 40 foot Contour Intervals
-Reclaimed Topography has 20 foot Contour Intervals
-Coordinate system is UTM Zone 12N (NAD27)

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Graymont Western US Inc.

- Conceptual Reclaimed Topography
- Big Sage Bonded Areas
- Graymont Fee Land
- Graymont State Lease
- Cross-Section Locations
- Conceptual Drainages

*Disturbance areas will be revegetated to meet 70% of original vegetative cover.

4.3 Reclamation Goals and Objectives

The goals of the Big Sage reclamation program are to minimize disturbance to the environment and to restore disturbed areas similar to their pre-disturbance state. The objectives of the reclamation programs are:

- ~~To minimize erosion damage and protect surface water resources through careful control of water runoff utilizing berms, storm water diversion ditches, and evaporation ponds.~~
- To establish surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of soil material or screened undersize limestone and dolomite material.
- To revegetate disturbed areas with a diverse mixture of plant species in order to establish long-term productive plant communities compatible with existing land uses.

4.4 Summary of Disturbance

The disturbance related to the NOI is discussed in Section 2.1 and is summarized in Table 2-1. The areas to be disturbed can be divided into the following categories: quarries, overburden/fines piles, roads, stockpiles, and ancillary disturbance. Graymont anticipates that the roads~~, with exception of haul roads within the quarry,~~ and stockpiles will be reclaimed and revegetated as required. Bench faces will not be reclaimed. Quarry benches and floors will be reclaimed if sufficient soil resources are available; otherwise, Graymont will request a variance.

4.5 Site Stabilization and Configuration

The ~~Project Area~~Permit Area will be stabilized, to the extent practicable, to minimize future impacts to the environment and protect air and water resources. Stable areas of the quarry slopes will be left in place to provide nesting areas for birds. Erosion will be controlled by revegetation, the placement of riprap, or other BMPs.

4.6 Site Specific Closure and Reclamation

4.6.1 Quarries

The limestone is comprised of competent material that forms cliffs in the surrounding area. Based on experience at the Poison Mountain Quarry and natural topographic features in the area, Graymont anticipates that quarry slopes constructed in limestone will be stable and left in place. In most cases, the final quarry slopes will range from seven to 25 degrees. There may be some locations where the hanging wall is exposed in which the average final quarry slope will be approximately 45 degrees. However, most of the areas where the slope is 45 degrees will be backfilled, and the slopes will be buried. The quarry slopes will be benched as shown in Figure 5. No unstable areas are anticipated. Portions of the quarry will be back-filled with overburden and fines. Material excavated from the quarry areas will be a typical carbonate-rock composition, and the major constituents will be calcite, dolomite, and silica.

Quarry roads, benches, and floors will be reclaimed if sufficient soils are available. Safety ~~B~~berms or boulders will be used to restrict access to the quarry slopes. Quarry materials will be used to create rock safety berms, where feasible. The access to benches no longer being used will also be restricted. Many of the quarry areas will be backfilled, which will eliminate the need for safety berms.

4.6.2 Roads

Haul roads within the bonded area will be reclaimed. Reclamation for haul roads will include regrading and scarifying compacted surfaces to a depth of at least two feet. The distance of the ripper shanks will not exceed three feet.

4.6.3 Overburden/Fines Piles

The tops of the overburden/fines piles will be covered with a layer of soil and seeded. In some areas, the slopes on the overburden/fines piles ~~will~~ may be left at angle of repose in an overall configuration which is stable. During reclamation, sloped surfaces having the potential to experience accelerated erosion will be contour furrowed, if necessary. Slopes of the piles that are ~~re~~contoured to an angle that is safe for equipment to work will be covered with a layer of soil and seeded. If sufficient soil is available, soil will be pushed from the edge of flat areas onto the slopes to the extent safe and practical in areas where slopes are too steep for equipment to work safely. Seed will be cast from the flat areas onto the slopes to the extent safe and practical. Final slopes will be blended into the surrounding natural topography, where practical. The overburden/fines piles will not contain deleterious or acid-forming materials.

4.6.4 Buildings, Equipment, Piping, Scrap, Reagents, and Other Materials

Temporary facilities, such as portable toilets, diesel fuel tanks, and lubricant containers, will be removed from the site during reclamation activities, Diesel fuel and lubricants will be disposed of in the appropriate manner and appropriate locations off-site. The area will be scarified and seeded.

During final mine closure, buildings, conveyors, and structures will be dismantled, and materials will be salvaged or removed to an off-site landfill or other appropriate disposal site. Concrete foundations and slabs, including re-bar, will be broken up using a track-hoe-mounted hydraulic hammer or similar methods and buried in place under approximately two feet of ~~material~~ growth media and/or fines in such a manner to prevent ponding and to allow vegetation growth. Re-bar will be sufficiently buried to prevent a safety hazard. After demolition and salvage operations are complete, the disturbed areas will be covered with growth media and seeded.

Reagents and explosives will be removed for use as product at other mines, or appropriately disposed. Any surface pipelines will be removed, typically for salvage. Underground pipeline ends will be capped/plugged and buried in place.

Waste materials stored in the "bone yard" located within the Facility Area will be removed at closure and disposed of in an approved off-site landfill or sent to appropriate recycling facilities, if available. Used oil and coolant will be removed for recycling or disposal in accorandance with state and federal regulations by a licensed firm. Solid waste will be shipped off-site to a local industrial landfill.

4.6.5 Storm Water Controls

Storm water controls in the topsoil stockpile area will be reclaimed, and a swale will be excavated in the location of the pre-mining ephemeral drainage. The swale will be excavated to approximate pre-mining topography, and the swale will be constructed in such a manner as to be stable during normal precipitation and snowmelt events. Pre-mining flow patterns will not be returned to the original state, but the storm water controls will be constructed in such a manner that the drainages will be stable.

Post-mining topography will be constructed so that features created by mining operations, such as the overburden/fines piles, will be stable. Benches will be included in reclaimed features. During reclamation, sloped surfaces ~~having the potential~~that are more likely to experience accelerated erosion will be contour furrowed.

4.6.6 Drill Holes

Any ~~D~~drill holes drilled as part of mining activities will be plugged in accordance with UDOGM rule R647-4-108.

4.7 Soil and Vegetation

The thickness of soil used during reclamation of the Project will depend on the amount of soil available. In general, the soils within the Amtoft-Amtoft very shallow-Lodar Association are thin and contain excessive quantities of gravel (in some cases greater than 60 percent) and reach bedrock at approximately 18 inches or less (SCS 1984, SRK 2007b). Soils within the Dera-Dera sandy loam association reach bedrock at greater than 60 inches but tend to contain greater than 35 percent gravel in subsurface horizons. A site reconnaissance performed by SRK in May 2004 and March of 2007 confirmed that soils were generally shallow. Areas potentially containing greater salvageable depths of soils were noted during the survey and are shown on Figure 8. Sodic soils were not observed although SCS data indicated that these soils may be present. Table 4-1 presents a description of the soil associations in the ~~Project Area~~Permit Area that could be disturbed during operations. Vegetation normally associated with each soil series is also included. Graymont will remove a minimum of a six-inch thickness of salvagable soils within the area of disturbance, where practicable.

According to the *Soil Survey of Part of the Fairfield – Nephi Area* (SCS 1984), the Big Sage Valley includes soils of the Amtoft-Amtoft very shallow-Lodar, Sanpete, moist-Spager, and the Dera-Dera sandy loam soil associations. However, only the Amtoft-Amtoft very shallow-Lodar and Sanpete, moist-Spager associations are within the footprint of disturbance.

4.7.1 Soil Balance

A preliminary soil balance was prepared to compare the soil quantities required for reclamation of the Big Sage ~~Project area~~Permit Area components to the quantities of soil available. For the soil balance, the following assumptions were used:

- soil will not be borrowed or imported from off-site sources;
- quarry benches and floors will be reclaimed if sufficient soil resources are available;
- portions of haul roads that extend into the quarries will be reclaimed if sufficient soil resources are available; and
- an average depth of approximately six inches of soil will be placed on all remaining project components where feasible (except for the soil stockpile areas) to be reclaimed.

Graymont will salvage available growth media and will apply for a variance if sufficient growth media is not found. Table 4-2 provides an estimate of the soil quantities involved.

Table 4-1: Soil Information

Soil Association	Soil Series	SAR	pH	Profile Description: Depth (in)	Profile Description: Texture*	Position on Landscape	Slope (%)	Depth to Bedrock (in)	Vegetation
Amtoft-Amtoft very shallow-Lodar	Amtoft	0-2	7.9-9.0	0-3	STXL	mountainsides	25-60	18	Utah juniper, black sagebrush, Douglas rabbitbrush, Nevada bluegrass
				3-8	STVL				
				8-18	STVL				
				18+	bedrock				
	Amtoft very shallow	0-2	7.9-9.0	0-3	GRVSL	ridges, mountainsides	15-40	10	Littleleaf mountain mahogany, pinyon, Utah juniper, black sagebrush, Nevada bluegrass
				3-7	GRVSL				
				7-10	GRVSL				
				10+	bedrock				
	Lodar	0-2	7.9-9.0	0-3	GRXL	mountainsides, mountain tops	20-60	17	Pinyon, Utah juniper, black sagebrush, bluebunch wheatgrass
				3-9	GRVL				
				9-17	CBVL				
				17+	bedrock				
Dera-Dera sandy loam	Dera	10-70	7.9-9.0	0-4	GRL	dissected alluvial fans	---	>60	Shadscale, galleta, spiny horsebrush, Indian ricegrass, bud sagebrush
				4-20	GRVL				
				20-60+	GRVSL				
	Dera sandy loam	10-70	7.9-9.0	0-3	GRSL	dissected alluvial fans	---	>60	Galleta, winterfat, Indian ricegrass, shadscale, sand dropseed, bud sagebrush
				3-14	GRVSL				
				14-60+	GRVL				
Sanpete-Spager	Sanpete	1-60	7.9 – 9.0	0-3	GRVL	alluvial fans and valley bottom	4-15	9-60	Bluebunch wheatgrass, Wyoming big sagebrush, Indian ricegrass, shadscale, bottlebrush squirreltail, low rabbitbrush
				3-9	GRVL				
				9-60	GRVSL				
	Spager	1-20	7.9 – 9.0	0-2	GRSL	alluvial fans and valley bottom	2-12	19-29	Black sagebrush Indian ricegrass, needleandthread,
				2-7	GRL				
				7-19	GRVSL				
				19-29	IND				

Source: SCS 1984; NRCS unpublished data

*Soil texture codes are based on the National Soil Information System classification. STXL = extremely stony loam, STVL = very stony loam, GRXL = extremely gravelly loam, GRVL = very gravelly loam, GRL = gravelly loam, GRVSL = very gravelly sandy loam, GRSL = gravelly sandy loam, and CBVL = very cobbly loam.

Table 4-2: Soil Quantities

Disturbance Activity	Soil Salvage Area (acres)	Recoverable Soil [1] (cy)	Revegetation Areas (acres)	Soil Volume Required (cy)	Soil Volume Difference (cy)
Big Sage Quarry Areas (North & South)	396.3	319,680	359.8	290,240	29,440
North Overburden/Fines Pile	22.9	18,470	11.7	9,440	9,030
Central Overburden/Fines Pile	96.4	77,760	72.5	58,485	19,275
Facility Area	~~0~~58.5	~~0~~47,190	58.5	47,190	~~-47,190~~0
Roads	19.8	15,970	19.8	15,970	0
Topsoil Stockpile	0	0	0	0	0
Total	5~~35.4~~93.9	4~~31,880~~79,070	522.3	421,325	10,555

[1] ~~Assumes only salvage of the Amtoft-Amtoft very shallow-Lodar Association soils.~~

[2] The depth of soils recovered will vary throughout the ~~Project Area~~Permit Area and will largely depend on topography and slope position. Although pockets of deeper soil may occur, an average of six inches depth to which soil may be recovered is used for calculation purposes.

4.8 Revegetation

4.8.1 Seed Mixtures

Graymont will use the seed mixes that were successful in reclamation of other quarries. The seed mixtures to be used will also be determined by commercial seed availability and UDOGM. The seed mix used in the Flat Iron test plots is shown in Table 4-3. Appendix ~~B~~C contains data regarding existing undisturbed vegetative cover in the vicinity of the Project.

Table 4-3: Reclamation Seed Mix

Seed	Percentage	Lbs PLS in 12 lbs/ac basis
Hycrest crested wheat grass	12	1.44
Luna pubescent wheat grass	24	2.88
Bozoisky Russian wildrye	24	2.88
Kochia Prostrata	4	0.48
Yellow sweetclover	12	1.44
Shadscale - VNS	12	1.44
Fourwing Saltbrush - VNS	12	1.44

4.8.2 Mulching and Fertilization

Mulching and other amendment requirements will be based on the experimental revegetation program and the reclamation experience obtained from reclamation of the Poison Mountain area.

Monitoring and evaluation of Graymont's Poison Mountain revegetation efforts commenced in 1996. Revegetation efforts took place on benches with limestone fines or growth media/topsoil media as support media for seeds. In some areas a limestone/growth media mixture was used. Treatments including mulching, fertilizing, and composting were used on those areas with limestone fines. Benches with limestone fines and one or more treatments ranged from less than one percent to thirteen percent vegetation cover (WP Natural Resources Consulting, Inc, 2003). Benches that contained a mixture of limestone and growth media ranged from 14 to 21 percent vegetation cover. Those areas with growth media/topsoil had vegetation cover of 34 percent (WP Natural Resources Consulting, Inc, 2003). In summary, those benches with the highest success rates contain growth media. Those areas that have a mixture of limestone fines and growth media did moderately well. Benches with limestone fines had the lowest success rates during the monitoring program. The success of various revegetation media is likely dependent on the water holding capacity of the media rather than soil amendments.

4.8.3 Seeding and Planting

Seeding methods utilized at the site will depend on many factors including the topography, soil conditions, and seed mixture. Typically, some combination of broadcast seeding~~, drill seeding,~~ and hydroseeding is used for mine reclamation. Seeding will take place in the fall, October or November. Compacted soils will be ripped to a depth of two feet prior to seeding. Uncompacted areas requiring revegetation will be scarified as needed and where safe to do so to create a suitable seedbed. On steep slopes, seed will be cast from flat areas onto the slopes to the extent safe and practical.

4.9 Reclamation Schedule

Regrading and reclamation will take place in areas permanently decommissioned prior to final closure. Final reclamation will begin after mining on remaining disturbed areas. Reseeding will be performed in October or November.

4.10 Monitoring

Monitoring will be conducted to check revegetation success and erosion control. Monitoring will take place periodically during the growing season and following extreme storm events.

Revegetation success will be determined by monitoring the amount of ground cover and comparing this value to one or more reference areas. Revegetation will be considered accomplished as per UDOGM Mineral Reclamation Rules (R-647-4) when the revegetation has achieved 70 percent of the pre-mining vegetation cover in the reference area. The survival of the vegetation for three growing seasons following seeding will be the time-criteria for defining revegetation success.

4.11 Safety and Site Control

Warning signs will be placed near reclamation work areas as appropriate. Warning signs will be highly visible, easy to read, and easy to understand. Signs that become faded and worn will be replaced.

4.12 Concurrent Reclamation

Concurrent reclamation of quarries and overburden/fines piles will take place as soon as practical and safe during mining activities. Portions of haul roads no longer required will be reclaimed. Area disturbed by soil stockpiles will be reclaimed after the soil is used in reclamation of the above areas.

4.13 Interim Reclamation

In the event that continuous, full-scale production is interrupted due to economic considerations or unforeseen circumstances, interim reclamation may be initiated. Interim reclamation is outlined below:

- *Roads:* The haul roads will receive routine maintenance.
- *Quarries:* Safety ~~B~~berms or fences will be placed to help restrict access to quarry areas.
- *Erosion Control Measures:* All erosion control measures and BMPs will be regularly inspected and maintained.

5. Surety

UDOGM requires operators to provide a reclamation surety to the State. Appendix ~~C~~D presents the ~~bond cost estimate~~reclamation surety estimate for the Big Sage Project. The ~~bond~~ surety totals $~~1,709,865~~2,114,753.

6. Signature Requirement

Based on reasonable inquiry, and to the best of my knowledge, I certify that the information contained in this document is true and correct:

____

Michael R. Brown
Vice President, Environmental Affairs
3950 South 700 East, Suite 301
Salt Lake City, UT 84107

Date: ______________

7. References

Mt. Nebo Scientific, Inc. (1998). T & E Species Survey Near the Cricket Mountains, Utah, August 1998.

National Resource Conservation Service formerly Soil Conservation Service (1984). Unpublished Department of Agriculture, Soil Conservation Service, *Soil Survey of Part of the Fairfield – Nephi Area*, Utah, June.

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Utah Division of Wildlife (2001). Mammal habitat coverages, Pronghorn Habitat; shapefile and metadata, www.dwrcdc.nr.utah.gov/ucdc/downloadsgis/disclaim.htm. Update May 2003.

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WP Natural Resource Consulting, Inc. (2003). *Assessment of Revegetated Test Benches and Reference Transects at the Cricket Mountain Plant,* June 2003.

Appendix A

Storm ~~w~~Water Control Calculations and Storm Water Pollution Prevention Plan

Drainage of the Hydrologic Basin Behind the Central Overburden/Fines Pile

As noted in the Big Sage NOI, the central overburden/fines pile will be built on an existing ephemeral drainage. The following calculations provide a conservative estimate for the amount of water that may pond behind the pile.

Based on a gradation previously performed on material from a similar overburden pile, the sample was considered to be highly fractured rock consisting of less than twelve (12) percent of the sample passing the 1-inch sieve. The d_{10} of the overburden is approximately 20 mm and the d_{60} is 394 mm. Randolph et al. (1996) conducted laboratory tests of various aggregates, and results yielded a hydraulic conductivity of 48,000 ft/day from a limestone aggregate with a d_{10} of 5.2 mm and a d_{60} of 12.5 mm. From this information, Graymont assumes an extremely conservative hydraulic conductivity, K, of the overburden to be 50,000 ft/day. The basin size for the ephemeral drainage has been determined to be 91 acres with a gradient of 0.068 ft/ft. Using the 100-yr/24-hr rainfall event the following analysis was used to determine the volume of water that may temporarily pond behind the proposed Central Overburden/Fines pile during the design event.

First, the theoretical peak discharge was obtained using the Rational Equation:

Q_{peak} =CiA where,

> Q_{peak} = peak flow rate in cubic feet per second (cfs)
>
> C = a dimensionless runoff coefficient and is defined as the ratio of the peak runoff rate to the rainfall intensity
>
> i= rainfall intensity in inches per hour
>
> A=drainage basin area in acres

C was assumed to be between 0.16 and 0.25 for sandy loam soils and a gradient of 6% (OSM, 1982). To be conservative, Graymont has assumed C = 0.25 for this exercise.

i=2.88 in/day = 0.12 in/hr=2.78 X 10^{-6} ft/s

A=91 acres = 3,963,960 ft^2

From the preceding:

Q_{peak} = CiA

Q_{peak} = 0.25 X (2.78 X 10^{-6} ft/s) X (3,963,960 ft^2) = 2.76 ft^3/sec

The peak discharge was then compared to the theoretical flowrate through a square foot of the overburden pile over a 24-hour period. For an assumed hydraulic conductivity of 50,000 ft/day;

$Q_{infiltration}$ = KIA, where I = hydraulic gradient, and A = area of infiltration

$Q_{infiltration}$ =50,000 ft/day X 0.068 ft/ft X 1 ft^2= 3400 ft^3/day

Therefore, $Q_{infiltration} = 0.039\ ft^3/sec$

Next, the surface area required to drain the peak discharge was calculated by dividing:

$$A_{infiltration} = \frac{Q_{peak}\ (ft^3/sec)}{Q_{infiltration}\ (ft^3/sec * ft^2)} = \frac{2.76\ ft^3/sec}{0.039\ ft^3/sec}$$

$A_{infiltration} = 69.37\ ft^2$

This area of infiltration may create a 25 ft X 31 ft pond less than 2.5 feet deep with a volume of less than 1500 cubic feet. Figure A shows the size of the pond. For calculation purposes, it is assumed that the pond remains full during the storm after which it begins to drain. As a conservative estimate, the 1500 cubic feet would drain in about one hour after the event assuming a constant infiltration area of 10 feet square. Ten square feet was chosen as a conservative infiltration area, given that the infiltration area would decrease from 69 to 0 as the pond drains.

$t_{drain} = 1500\ ft^3 / (0.039\ ft^3/sec\ X\ 10\ ft^2) = 3846\ seconds = 1.1\ hrs$

Therefore, the small pond created during the rain event would infiltrate in about 1.1 hrs.

Conclusions:

The preceding calculations indicate that very little water, less than 1500 ft^3 (0.03 acre feet), may pond behind the central overburden fines pile during the 100 year, 24 hour storm event. Any water that may pond will drain through the pile about an hour after the event.

References:

Randolph, B.; Cai, J.; Heydinger, A.; Gupta, J. D. 1996. Laboratory Study of Hydraulic Conductivity for Coarse Aggregate Bases, Transportation Research Record, Vol. 1519.

U.S. Department of the Interior, Office of Surface Mining (OSM). 1982. Surface Mining Water Diversion Design Manual. OSM/TR-82/2.

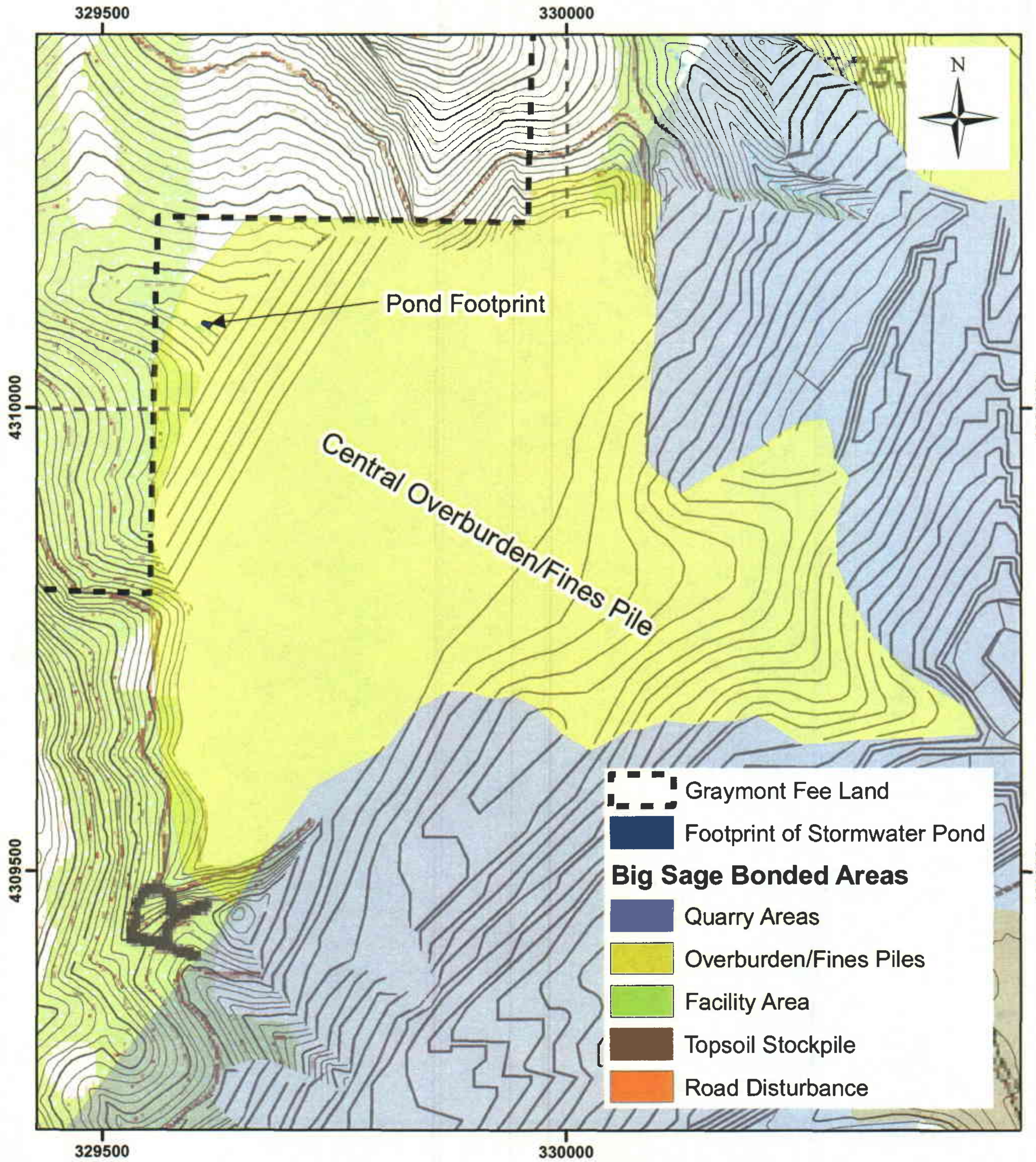
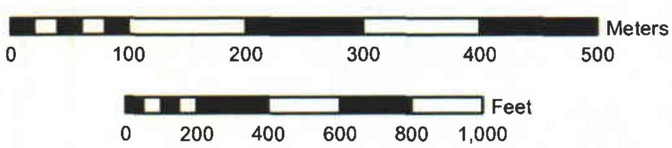


Figure A. Calculated Maximum Stormwater Pond Footprint
-Surveyed Topography has 10 foot Contour Intervals
-Topographic Base is Candland Spring, UT
7.5' USGS Quadrangle 40 foot Contour Intervals
-Quarry and Overburden/Fines Topography
has 20 foot Contour Intervals
-Coordinate system is UTM Zone 12N (NAD27)



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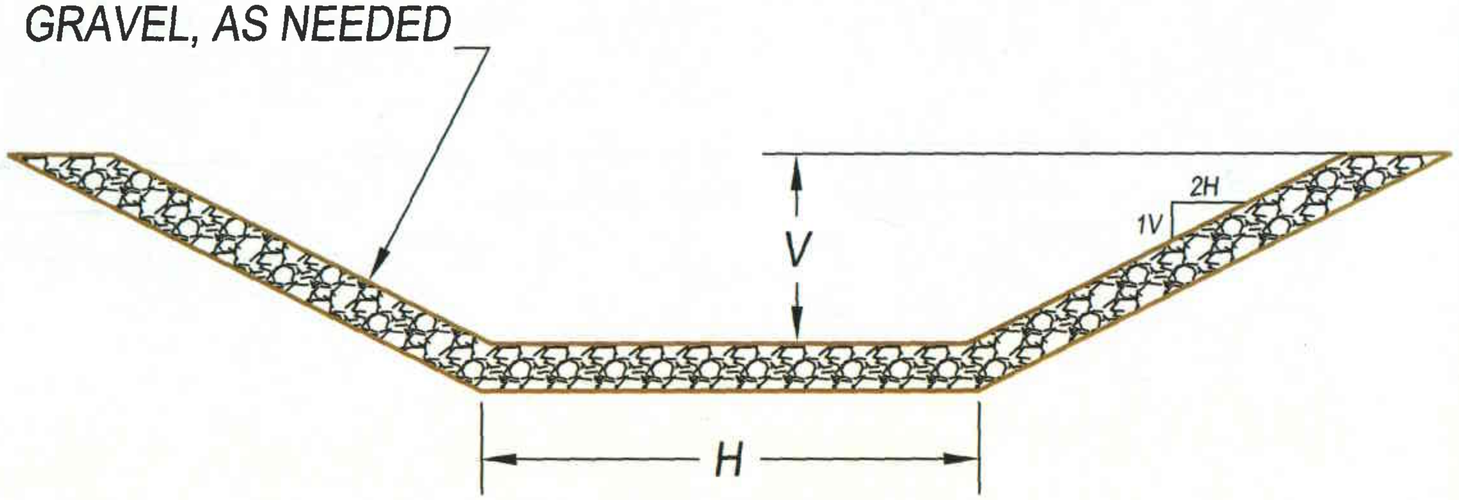
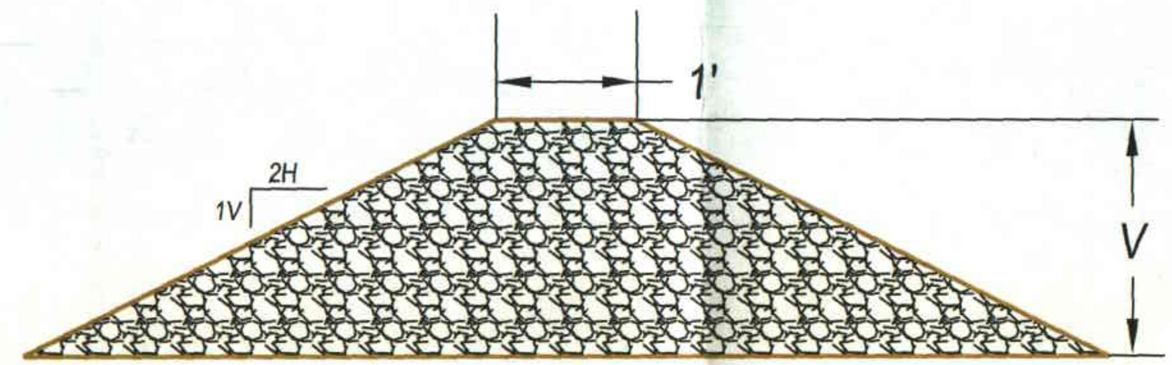
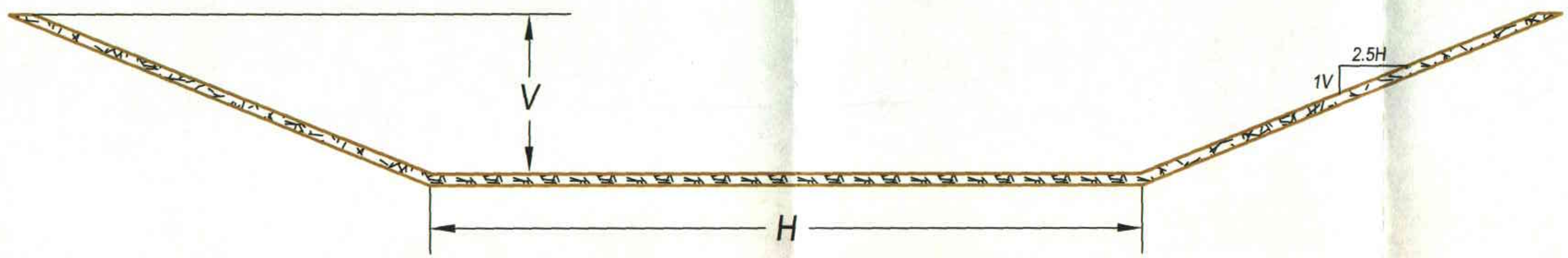
ACTUAL DIMENSIONS WILL
VARY WITH TOPOGRAPHY



STORMWATER DIVERSION DITCH CROSS-SECTION (TYP)



STORMWATER DIVERSION BERM CROSS-SECTION (TYP)



SWALE CROSS-SECTION (TYP)

SRK Consulting, Engineers and Scientists, Elko, Nevada			Graymont Western	DRAWING TITLE: BIG SAGE STORM WATER CONTROLS		
DESIGN: RMK	DRAWN: RMK	REVIEWED: VS	Big Sage Project	DRAWING NO. A1	SHEET 1 OF 1	REVISION NO. A
CHECKED:	APPROVED:	DATE: 5/6/08		SRK JOB NO.: 138406 – Task 300		
FILE NAME: 138406_Big Sage_Stormwater Controls_Figure A1_20080515.dwg						

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Technical Memorandum

To:	Andrew Rupke, Graymont Western US, Inc.	**Date:**	May 8, 2008
cc:	Renee Kockler	**From:**	Dave Wanner, SRK Consulting (U.S.)
Subject:	Big Sage Storm Water Retention Pond for the Facilities Area – Pond Sizing Analysis	**Project #:**	138406 - 400

1 Background and Scope of Work

This Technical Memorandum describes the analysis performed to size a storm water retention pond for the proposed Big Sage Project owned and operated by Graymont Western US, Inc. The proposed storm water retention pond is designed to collect and evaporate storm water from the 25-year, 24-hour storm event over an area of approximately 58.5 acres, which encompasses the proposed Big Sage facilities area.

2 Design Methodology

The storm water analysis was performed using WinTR-55, which is a single-event rainfall-runoff small watershed hydrologic model. The model generates hydrographs from both urban and agricultural areas and at selected points along the stream system. Hydrographs are routed downstream through channels and/or reservoirs. Multiple sub-area watersheds can be modeled within the watershed. Each sub-area has a hydrograph generated from the land area based on the land and climate characteristics provided. The accumulation of all runoff from the watershed is represented at the watershed outlet. In this analysis, the watershed outlet is the storm water retention pond. The graphical WinTR-55 output is attached.

The storm water event data used for this analysis were evaluated based on the *Precipitation Frequency Atlas of the United States*, Atlas 14, Volume 1, Version 4 from the National Oceanic and Atmospheric Administration (NOAA). Point precipitation frequency estimates from the Atlas were selected based on the Big Sage Project location of 38.92° N, 112.957°W. The 24-hour storm events with recurrence intervals of 10, 25, and 100 years are provided in Table 1-1 below.

Table 1-1: Storm Event Data for the Big Sage Project

Frequency/Duration	Precipitation	Source
10-Year/24-Hour	1.95 inches	NOAA Atlas 14, vol. 1, v.4
25-Year/24-Hour	2.31 inches	NOAA Atlas 14, vol.1, v.4
100-Year/24-Hour	2.88 inches	NOAA Atlas 14, vol.1, v.4

Evaporation

The evaporation rate used in this analysis was obtained from historical climate information located on the Western Regional Climate Center website (www.wrcc.dri.edu). Monthly average pan evaporation from the Sevier Dry Lake in Millard County, Utah was selected for this design, which is approximately nine miles northwest of the Big Sage Project.

Storm Water Retention Pond Design

The design dimensions of the storm water retention pond were analyzed to develop a pond footprint area and depth that could be easily constructed within a limited surface area. Seven different pond footprint sizes ranging from one acre to 4.5 acres were selected, and the depths of these ponds were calculated based upon the holding capacity of the 25-Year/24-Hour storm event. Once the pond depths were calculated, an additional three feet of depth was added to the calculated pond depth to account for one foot of sediment, one foot of existing water stored due to previous storm events, and one foot of freeboard.

Based on the average evaporation rates and the design criteria discussed above, an storm water retention pond area of two acres with a depth of seven feet would be more than sufficient to handle the run-off from the 25-year, 24-hour storm event, accumulated sediment, previously existing stored water, and free-board. The attached calculation sheet shows the various pond dimensions, design capacities, and input parameters.

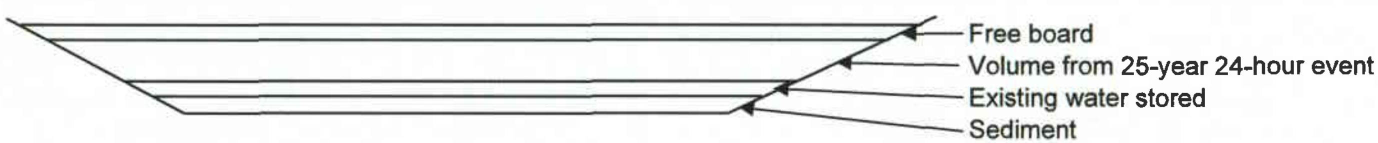
Big Sage Stormwater Retention Pond
Facilities Area

303,550 cuft run-off (25 year/24 hour storm event) - TR55 Storm water Analysis
2,270,554 gallons
7.0 acre-ft
57.16 inches evaporation (Sevier Dry Lake)
4.76 feet evaporation

Pond dimensions

Area at top of water (acres)	Area at top of water (sqft)	Top (ft)	Bottom (ft)	Depth of Water Collected from 25-yr 24-hour Event (ft)	Total Depth of Pond* (ft)	Total Pond Size Measured from Inside Crest (acres)
1	43,560	209	203	7.2	10.2	1.1
2	87,120	295	272	3.8	6.8	2.1
2.5	108,900	330	315	2.9	5.9	2.6
3	130,680	361	343	2.4	5.4	3.1
3.5	152,460	390	369	2.1	5.1	3.6
4	174,240	417	393	1.8	4.8	4.1
4.5	196,020	443	416	1.6	4.6	4.6

* Total depth accounts for one foot of sediment, one foot of existing water, depth from 25-year 24-hour event, and one foot of free board.



STORM WATER POLLUTION PREVENTION PLAN

FOR

GRAYMONT WESTERN US INC.
CRICKET MOUNTAIN PLANT
P.O. Box 669
Delta, Utah 84624

DATE OF LAST PLAN AMENDMENT: August 31, 2004

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1.0 INTRODUCTION AND FACILITY INFORMATION

1.1 INTRODUCTION

This Storm Water Pollution Prevention Plan (SWPPP) for Graymont Western US Inc.'s (Graymont) Cricket Mountain Plant was prepared to meet the requirements of the Clean Water Act (CWA) and the Utah Pollutant Discharge Elimination System (UPDES) General Permit for Storm Water Discharges Associated with Industrial Activity, Permit No. UTR000168 (General Permit).

The purpose of this SWPPP is to identify the actions Graymont has implemented to minimize contamination of storm water at the Cricket Mountain Plant. The main objectives of the SWPPP are to identify the sources of pollution that may affect the quality of storm water runoff and to implement Best Management Practices (BMPs) to reduce potential pollutants in storm water runoff. This SWPPP details general storm water pollution prevention procedures and site-specific information regarding the Quarry and Processing Plant. The plan also describes the site location and industrial activities, material handling practices, and storm water management and controls.

1.2 FACILITY INFORMATION

Graymont's Cricket Mountain Plant, which includes the Quarry and Processing Plant, are located west of Highway 257, approximately 32 miles south of Delta, Utah. The distance between the Quarry and the Processing Plant is approximately six miles. The legal descriptions of the sites are:

- **Quarry:** Sections 25 and 36, Township 21 South, Range 10 West.
- **Processing Plant:** Section 36, Township 21 South, Range 9 West; and Section 1, Township 22 South, Range 9 West.

Figures 1 and 2 display the features of the Processing Plant. The topographic and geographic characteristics, and the pertinent site features of the Quarry are shown in Figures 3, 4, and 5.

1.3 DESCRIPTION OF INDUSTRIAL ACTIVITIES

The Cricket Mountain Plant produces chemical-grade lime and crushed limestone products for commercial sale. The limestone processed at the plant is obtained from the Quarry. The following sections briefly describe the Quarry and Processing Plant.

1.3.1 Quarry

The primary features at the Quarry are the active quarry areas, the Crushing and Screening area, the undersized limestone material (limestone fines) stockpile area, and the Maintenance Shop Area. Primary site features are shown on Figures 3, 4, and 5 (note that the topography in the quarries shown in Figures 4 and 5 are constantly changing and may not reflect the current site layout).

Drilling and blasting techniques are used to remove overburden material and limestone. Following blasting and mining, the limestone is transported by truck to the crusher, where it is crushed and screened. The crushed limestone is temporarily stored in stockpiles near the crusher and is ultimately loaded into trucks and transported to the Processing Plant. Limestone fines are stockpiled on the ground in the Crushing and Screening Area and sold to customers.

The Maintenance Shop Area is primarily used for equipment storage and maintenance, equipment fueling, and material storage. Primary site features and the storage areas are shown on Figure 3.

1.3.2 Processing Plant

The Processing Plant is shown on Figures 1 and 2. Primary site features include limestone stockpiles, lime processing equipment, equipment maintenance shops, an office building, limestone fines and kiln dust storage area, final product storage silos, a coal storage area, vehicle fueling areas, and material storage areas.

Crushed limestone from the quarry is temporarily stored in stockpiles. The crushed limestone is conveyed to coal-fired rotary kilns where it is calcined to lime. The resulting product is cooled, crushed to size, and temporarily stored in silos. The lime product is loaded into rail cars or trucks and transported to customers. Coal used to fire the kilns is transported to the plant via trucks and stored in enclosed storage silos. A small quantity of coal is stored in a stockpile for emergency use.

Crushed limestone from the quarry is also conveyed to and sized at the Carbonate Plant. This material is loaded into trucks and transported to customers.

2.0 STORM WATER POLLUTION PREVENTION TEAM

As required by the General Permit, the Cricket Mountain Plant has identified a Storm Water Pollution Prevention Team (SWPPT). The team is responsible for developing, implementing, maintaining, and revising the SWPPP. The position titles and assignments of the main team members are listed below. Additional team members may be assigned on an as-needed basis.

Table 1: Storm water Pollution Prevention Team

POSITION	SWPPP RESPONSIBILITIES
Plant Manager	• Signatory for certifications • Coordinate SWPPP development, implementation, and review • Oversee site inspections and reports • Oversee spill response
Plant Superintendent/Assistant Plant Manager	• Coordinate with the SWPPT and other personnel regarding spill response and preventive maintenance programs • Secondary SWPPP reviewer • Coordinate employee training • Assist with BMP implementation
Plant Engineer	• Perform site inspections and sampling (quarterly visual inspections, quarterly visual monitoring of storm water quality, analytical monitoring, annual site compliance evaluation) • Primary SWPPP reviewer • Prepare regulatory submittals • Perform employee training • Perform recordkeeping
Maintenance Supervisor	• Oversee preventive maintenance program and equipment repairs • Oversee maintenance of BMPs • Assist in conducting site inspections
Quarry Supervisor	• Notify Plant Engineer of changes at the quarry that may affect storm water drainage • Assist in conducting inspections at the Quarry
Production Supervisors	• Notify Plant Engineer of changes at the Processing Plant that may affect storm water drainage • Assist in conducting inspections at the Processing Plant
Corporate Environmental Group	• Determine spill reporting requirements • Report spills to regulatory agencies

3.0 STORM WATER DRAINAGE SYSTEMS AND RUNOFF MANAGEMENT

3.1 QUARRY

Limestone is presently mined from two quarries, Flat Iron Quarry and the Dolomite Quarry. Mining will commence in the East Alsop Quarry during the summer of 2004. The topography of the quarries is constantly changing due to mining activities. Rain water that falls in or snowmelt in the quarries either soaks into the ground or forms puddles on the quarry floor. The puddles either evaporate or soak into the ground. The quarry floors are relatively flat and are gently sloped to prevent storm water from leaving the quarry areas. In addition, berms are constructed along the outer edge of the quarry floors, which prevent storm water from leaving the quarry areas.

The Crushing and Screening Area and limestone stockpiles are located in low-lying areas or are protected by berms. Any flat areas are sloped towards the stockpiles or Crushing and Screening Area. Storm water in these areas either immediately soaks into the ground or migrates by sheet flow to low areas and forms puddles that either evaporate or soak into the ground. No storm water is discharged from the Crushing and Screening Area.

The Maintenance Shop Area is located in a low-lying area that is surrounded by hillsides and the quarry haul road. Any storm water that falls in this area either soaks into the ground or forms puddles where the water either soaks into the ground or evaporates. No storm water is discharged from the Maintenance Shop Area.

The quarry haul roads are protected on both sides by berms. Under certain rainfall conditions, storm water will travel along the berms to designated catch basins that are located onsite, to the Maintenance Shop Area, or Crushing and Screening Area. The water that collects in the catch basins or other areas either soaks into the ground or evaporates. No storm water is discharged off the property from the catch basins or haul roads within the quarry areas or Crushing and Screening Area.

3.2 PROCESSING PLANT

The Processing Plant area includes the coal stockpile, kiln dust/limestone fines stockpiles, the crushed limestone stockpiles, and all processing equipment. The Processing Plant area is relatively flat. The area gently slopes down towards the main processing area (see Figure 1). Storm water that falls in the Processing Plant either soaks into the ground or forms puddles in low areas that either evaporate or soak into the ground. No storm water is discharged from the Processing Plant.

The coal stockpile is located in a low-lying area where the surrounding area gently slopes towards the stockpile. In addition, a berm has been constructed on the north and east sides of the coal stockpile area. Storm water in the coal stockpile area either soaks into the stockpile or ground or forms puddles where the water either evaporates or soaks into the ground. Storm water is contained in the coal stockpile area and is not discharged.

The limestone fines and lime kiln dust stockpile located west of the plant is either located below grade or protected by a berm so that all storm water is contained on site. A second stockpile is located north of the plant. The berm that supports the railroad tracks surrounds the pile on three sides. The land on the fourth side gently slopes towards the pile. Storm water that contacts the stockpiles either soaks into the piles or forms puddles at the base of the piles where the water either soaks into the ground or evaporates.

4.0 INVENTORY OF EXPOSED MATERIALS

Significant materials that are handled, stored, processed, treated, or disposed of in a manner that has the potential for exposure to storm water are listed in Table 2. This table summarizes information regarding material type, storage method and location, the risk potential that the materials pose to storm water quality, the pollutant of concern, and material management practices and storm water controls (Best Management Practices or BMPs).

Table 2: Significant Materials Inventory

MATERIAL TYPE	PHYSICAL STATE	STORAGE METHOD	MAP LOCATION ID	QUANTITY STORED	RISK POTENTIAL POSED TO STORM WATER QUALITY	POLLUTANT OF CONCERN	STORAGE AND BMP INFORMATION
QUARRY							
Diesel Fuel	Liquid	Aboveground tanks: (2) 10,000-gal tanks	Fig. 3 – Diesel Tanks	20,000 gallons	Extremely Low	Hydrocarbons	The tanks are located within a concrete containment structure that is designed to contain the full volume of a tank.
Lubricating Oils	Liquid	(10) 55-gal drums	Fig. 3 – Maintenance Shop Area	550 gallons	Extremely Low	Hydrocarbons	New drums are stored outside on pallets. Drums in use are stored in an enclosed storage shed that has a sunken floor that is designed to contain spills.
Motor Oil	Liquid	Aboveground tanks: (2) 1,000-gal tanks (3) 500-gal tanks	Fig. 3 – Oil Tanks	3,500 gallons	Extremely Low	Hydrocarbons	Oil is stored in aboveground storage tanks that are either stored on an existing concrete pad or will be stored on a concrete pad that is surrounded by a curb, which will be constructed in the summer of 2004.
Used Oil	Liquid	Aboveground tanks: (1) 1,000-gal tank (2) 500-gal tanks	Fig. 3 – Used Oil Tanks	2,000 gallons	Extremely Low	Hydrocarbons	Used oil is stored in aboveground storage tanks that are either stored on an existing concrete pad or will be stored on a concrete pad that is surrounded by a curb, which will be constructed in the summer of 2004.
Methanol	Liquid	(8) 55-gal drums	Fig. 3 – Maintenance Shop Area	440 gallons	Extremely Low	Methanol	New drums are stored outside on pallets. Drums in use are stored in an enclosed storage shed that has a sunken floor that is designed to contain spills.
Antifreeze	Liquid	(2) 275-gal totes	Fig. 3 – Maintenance Shop Area	550 gallons	Extremely Low	Ethylene glycol	The antifreeze will be stored on the concrete pad that is surrounded by a curb and will be constructed in the summer of 2004.
Limestone Fines	Solid	Stockpiled on ground	Fig. 3 – Fines Stockpile	Quantity varies	Low	Suspended Solids	Stockpiles are located in low-lying areas that gently slope towards the stockpiles or the Crushing and Screening Area or are protected by berms.
Crushed Limestone	Solid	Stockpiled on ground	Fig. 3 – Limestone Stockpiles	Approximately 10,000 tons	Low	Suspended Solids	
PROCESSING PLANT							
Muriatic Acid	Liquid	(1) 50-gal drum	Fig. 2 – Acid Drum Storage Area	50 gallons	Extremely Low	Muriatic Acid	New drums are stored outside the Maintenance Shop. Drums in use are stored either in the shop or within an enclosed storage shed located next to the shop. The shed has a sunken floor that is designed to contain spills.
Lime	Solid	Storage silos	Fig. 2 – Lime Storage Silos	4,000 tons	Very Low	Suspended Solids; pH	Lime is stored in enclosed storage silos and is subsequently loaded into enclosed railcars or trucks for shipment.
Grease	Paste	Small containers: (3) 120-pound containers	Fig. 2 – Drum & Container Storage Area	360 pounds	Extremely Low	Hydrocarbons	New containers are stored on pallets next to the Diesel Tank Containment Area. Containers in use are stored either in the shop or in an enclosed storage shed located next to the shop. The shed has a sunken floor that is designed to contain spills.
Calcium or Magnesium Chloride	Solid	Not stored onsite	Not stored onsite	Not stored onsite	Extremely Low	Calcium or Magnesium Chloride	Calcium chloride is applied to the roads for dust control. The material is used immediately after purchase and is not stored on site. Product is designed to be applied to the roads where contact with storm water is expected.
Methanol	Liquid	(1) 55-gal drum	Fig. 2 – Contractor Area	55 gallons	Extremely Low	Methanol	The drum is stored on the concrete pad* at the Contractor Area.

Table 2: Significant Materials Inventory *(continued)*

MATERIAL TYPE	PHYSICAL STATE	STORAGE METHOD	MAP LOCATION ID	QUANTITY STORED	RISK POTENTIAL POSED TO STORM WATER QUALITY	POLLUTANT OF CONCERN	STORAGE AND BMP INFORMATION
PROCESSING PLANT (continued)							
Unleaded Gasoline	Liquid	Aboveground tank: (1) 2,000-gal tank	Fig. 2 – Gasoline Tank	2,000 gallons	Extremely Low	Hydrocarbons	Tank is located in a concrete containment structure that is designed to contain the volume of the tank.
Diesel Fuel	Liquid	Aboveground tanks: (2) 10,000-gal tanks (1) 12,000-gal tank (2) 500-gal tanks	Fig. 2 – Diesel Tanks	33,000 gallons	Extremely Low	Hydrocarbons	The two 10,000-gallon tanks are located in two separate concrete containment structures. The 12,000-gallon Contractor Diesel Tank is located within a lined earthen containment area. One 500-gallon tank is located on Fuel Dispensing Station Pad. The second 500-gallon tank is located at the Sugar Stone Screener.
Hydraulic Oil	Liquid	Aboveground tanks: (3) 500-gal tanks	Fig. 2 – Hydraulic Oil Tanks	1,500 gallons	Extremely Low	Hydrocarbons	The tanks are located in the main processing area where the surrounding area gently slopes down to the main processing area.
Oils and lubricants	Liquid	Aboveground tank: (1) 275-gal tank	Fig. 2 – Drum & Container Storage Area & Contractor Area	275 gallons	Extremely Low	Hydrocarbons	New oils and lubricants in the Processing Plant are stored on pallets next to the Diesel Tank Containment Area. Containers in use are stored inside an enclosed storage shed located next to the shop. The shed has a sunken floor that is designed to contain spills. Containers and the 275-gallon tank at the Contractor Area are stored on a concrete pad*.
Ethylene Glycol (Antifreeze)	Liquid	(1) 1,000-gal aboveground tank, (3) 375-gal totes, & (1) 55-gal drum	Fig. 2 – Ethylene Glycol Tank, Drum & Container Storage Area, & Contractor Area	2,180 gallons	Extremely Low	Hydrocarbons	New totes are stored on pallets next to the Diesel Tank Containment Area. Totes in use are stored either inside the shop or within an enclosed storage shed located next to the shop. The shed has a sunken floor that is designed to contain spills. The tank is located in the main processing area where the surrounding area gently slopes down to the main processing area. The drum at the Contractor Area is stored on a concrete pad*.
Used Oil	Liquid	Aboveground tank: (1) 400-gal tank (6) 55-gal drums	Fig 2. – Used Oil Tank & Contractor Area	730 gallons	Extremely Low	Hydrocarbons	The tank is located on a concrete pad in the main processing area. Contractor's used oil drums will be stored on a concrete pad*.
Coal	Solid	Storage silos and stockpile	Fig. 2 – Coal Storage Pile	Quantity varies	Low	Suspended Solids	The coal stockpile is located in a low-lying area where the surrounding area gently slopes towards the stockpile. A berm has been constructed on the north and east sides of the pile.
Crushed Limestone	Solid	Stockpiled on ground	Fig. 2 – Crushed Limestone Stockpiles	Quantity varies	Low	Suspended Solids	Area surrounding the stockpiles gently slopes towards the stockpiles or the plant.
Kiln Dust and Limestone Fines	Solid	Stockpiled on ground	Fig. 1 – Lime Kiln Dust Storage Areas	Quantity varies	Low	Suspended Solids	The stockpile west of the Processing Plant is located below grade or protected by a berm. A second stockpile is located north of the main processing area. The berm that supports the railroad track surrounds this pile on three sides and contains any storm water in the area immediately surrounding the pile. The land along the fourth side of this pile slopes gently towards the pile.

*The concrete pad at the Contractor Area will be constructed during the summer of 2004.

5.0 RISK IDENTIFICATION AND SUMMARY OF POTENTIAL POLLUTANT SOURCES

This section describes activities or additional sources at the Cricket Mountain Plant that have the potential to affect storm water quality. Table 3 identifies each activity or source that was evaluated and provides an assessment of the risk the source or activity poses to storm water quality. For all of the pollutant sources listed, storm water either soaks into the ground or stockpiles or forms puddles that either soak into the ground or evaporate. Any suspended solids in the storm water remain in the area when the water soaks in or evaporates. Storm water is not discharged from the areas surrounding the pollutant sources listed in Table 3.

Table 3: Potential Pollutant Sources

POLLUTANT SOURCE	POLLUTANT OF CONCERN	RISK POTENTIAL POSED TO STORM WATER QUALITY	BMP INFORMATION
MATERIAL TRANSFER OPERATIONS - QUARRY			
Petroleum products (oils, lubricants, and fuels)	Hydrocarbons	Extremely low	Drip pans are located at the oil storage tanks to collect small spills during oil transfer operations. Delivery trucks and equipment park on a concrete pad when transferring fuel to or from the diesel tanks. Personnel are in attendance during all transfers of petroleum products.
Limestone, crushed limestone, limestone fines	Suspended Solids	Very low	Crushed limestone and limestone fines are temporarily stored in stockpiles in the Crushing and Screening Area. The Crushing and Screening Area is located in a low-lying area. Surrounding area gently slopes towards the stockpiles or crushing and screening operations or are protected by a berm.
MATERIAL TRANSFER OPERATIONS – PROCESSING PLANT			
Petroleum products (oils, lubricants, and fuels)	Hydrocarbons	Extremely low	Delivery trucks and plant vehicles park on a concrete pad when transferring fuel to or from the fuel tanks. Personnel are in attendance during all transfers of petroleum products.
Crushed limestone	Suspended Solids	Very low	Crushed limestone is transported from the Quarry by truck and offloaded into a hopper and conveyor system that deposits the limestone in one of several stockpiles. The surrounding area slopes gently towards the stockpiles or towards the Processing Plant.
Lime	Suspended Solids and pH	Very low	A retractable spout is used when loading railcars and trucks to minimize spillage.
Limestone fines and Kiln Dust	Suspended Solids and pH	Low	Fines are transported by front end loader and dust is loaded into trucks to minimize spillage.
Coal	Suspended Solids	Low	Coal is unloaded into an underground hopper and conveyed up to the storage silos or transported to the stock pile by a front-end loader. The surrounding area slopes down towards the unloading area and the coal stockpile.
OUTDOOR STORAGE NOT INCLUDED IN TABLE 2			
Obsolete and unused equipment	Hydrocarbons & Suspended Solids	Extremely low	Storage area is flat and surrounded by a small earthen berm.
OUTDOOR PROCESSING ACTIVITES – QUARRY			
Mining limestone	Suspended Solids	Very low	Quarry floors are relatively flat and gently sloped to prevent storm water from leaving the quarry area. Berms are constructed along the outside of the quarry floor.
Limestone crushing and screening operations	Suspended Solids	Very low	Crushing and Screening Area is located in a low-lying area. Flat areas slope towards the crushing and screening operations or are protected by a berm.
OUTDOOR PROCESSING ACTIVITES – PROCESSING PLANT			
All processing activities, such as crushing and sizing lime, the calcination of lime, and the Carbonate Plant, all occur within buildings or enclosed equipment.			

Table 3: Potential Pollutant Sources *(continued)*

POLLUTANT SOURCE	POLLUTANT OF CONCERN	RISK POTENTIAL POSED TO STORM WATER QUALITY	BMP INFORMATION
DUST GENERATING ACTIVITES			
Blasting stone Removing the limestone Crushing and screening processes Transfer of dry materials Driving on unpaved roads	Suspended solids	Low	Any storm water that contacts dust in the Quarry or Processing Plant remains onsite and is not discharged as described in previously.
WASTE DISPOSAL PRACTICES – QUARRY			
Trash	Hydrocarbons and Wind-blown Debris	Extremely low	Trash is collected in drums and transported to the Processing Plant where it is transferred into a dumpster. Used oils and lubricants are collected in receptacles or aboveground storage tanks. These materials are periodically picked up for recycling.
WASTE DISPOSAL PRACTICES – PROCESSING PLANT			
Trash	Hydrocarbons and Wind-blown Debris	Extremely low	Trash is placed into a dumpster for proper disposal. Used oils and lubricants are collected in receptacles. These materials are periodically picked up for recycling.

6.0 EPCRA SECTION 313 WATER PRIORITY CHEMICALS

The Processing Plant is subject to the EPCRA Section 313 reporting requirements. The chemicals that have been reported in previous years include dioxin and dioxin-like compounds, lead, manganese, and mercury compounds. Of these four chemicals, only lead is listed as a Section 313 Water Priority Chemical in Appendix III of the General Permit. However, the lead is present onsite as lead sulfide in the limestone and is in a solid form. Therefore, a certification is provided in lieu of meeting the requirements in Part III.E.2. of the General Permit. The certification is provided in Section 16.0.

7.0 SPILLS AND LEAKS

No significant spills or leaks have occurred in the Quarry or Processing Plant in the three years prior to the date of submission of the *Notice of Intent (NOI)*. Spills and/or leaks that have occurred since issuance of the General Permit have been, and future spills and/or leaks will be, recorded on a Spill Report Form (blank form contained in Appendix A) in accordance with the guidelines contained in Section 10.3. Completed forms will be maintained in Appendix B and will be updated as necessary during the term of this permit.

8.0 SAMPLING DATA

As of the date of the completion of this SWPPP, no storm water runoff has been discharged from the Cricket Mountain Plant. All storm water remains onsite and either soaks into the ground or evaporates due to the dry climate of the region. Consequently, storm water discharge samples have not been collected or analyzed.

9.0 BEST MANAGEMENT PRACTICES

After reviewing the potential storm water pollutants at the Cricket Mountain Plant and considering issues such as effectiveness, level of potential risk, and maintenance, a list of BMPs was generated, evaluated, and implemented to reduce the risk of storm water contamination. Sections 4 and 5 describe the structural BMPs that have been implemented. Table 4 lists additional BMPs implemented at the Cricket Mountain Plant that minimize the potential of storm water contamination.

Table 4: BMP Identification

BMPs	BRIEF DESCRIPTION OF ACTIVITIES
Good Housekeeping	• Personnel are instructed to dispose of their garbage in trash cans or dumpsters and to pickup any wind-blown trash or debris and place it in the appropriate container. • Empty storage containers are promptly and properly disposed of. • Personnel continuously inspect the facility for any spills or leaks as part of their routine duties. • All spills or leaks are promptly cleaned up and reported, if required, in accordance with Section 10. • All materials are stored in a manner that minimizes the potential for contact with storm water (*e.g.*, on pallets, in sheds or shops). • An active inventory of raw materials used and stored at the Quarry and Processing Plant that have the potential to be exposed to storm water is maintained (see Table 2). • All oil, chemical, and hazardous waste containers are labeled to indicate the contents of the container. • Obsolete and unused equipment that is currently stockpiled at the facility is inspected for leaks or spills on a regular basis as part of the Quarterly Visual Inspection. • Obsolete and unused equipment that is generated in the future will be drained of fluids, if possible. • Obsolete equipment is disposed of when possible.
Preventive Maintenance	• Cricket Mountain Plant's preventive maintenance program includes periodic inspections and testing of equipment. • Structural BMPs are inspected as part of the Quarterly Visual Inspection and repaired as needed.
Sediment and Erosion Control	• Sloped, undisturbed portions of the Quarry are generally covered with natural vegetation. • The Quarry itself is solid rock, which is not considered susceptible to erosion. • Topography of the quarry floors, sloping of the areas surrounding the stockpiles and crushing area, and the construction of berms along the roadways minimizes erosion. • Storm water that migrates along the roadways is directed into designated catch basins and does not leave the quarry area. Sediment remains in the catch basins. • Gravel is used in some areas in the Processing Plant as roadbase to minimize erosion. • The Processing Plant area is relatively flat and overland storm water flow in this area typically does not occur.
Inspections	• Inspections of BMPs are performed as required by the General Permit and this SWPPP.
Miscellaneous	• Personnel exercise care to minimize dust generation when handling coal, kiln dust, and limestone fines. • Materials are wetted when possible for dust-generating processes. • Particulate control equipment is maintained.

10.0 SPILL PREVENTION AND RESPONSE

10.1 SPILL PREVENTION

Spill prevention measures are described in Sections 4 and 5.

10.2 SPILL RESPONSE AND CLEAN UP

Minor spills that are confined to small areas will be cleaned up as part of the Cricket Mountain Plant's ordinary operating practices. In cases where a larger spill has occurred, but is confined to the Cricket Mountain Plant property, cleanup will proceed as described below. The procedures will be modified as needed when unforeseen circumstances arise.

10.2.1 Initial Spill Response Actions

⇒ The first person on the scene must notify their Supervisor of the spill.

⇒ Evaluate the health hazards in the area before proceeding.

⇒ If any health risk is associated with the spilled material, evacuate the area immediately and establish a security zone around the spill, if needed, and control access into the security zone. Personnel not directly involved with the spill need to stay away from the spill area.

⇒ Stop the release if it is safe to do so:

- Implement safety-related measures as needed;
- Mobilize fire control equipment, if needed;
- Don appropriate personal protective equipment; and,
- Remove all ignition sources before entering the spill area.

⇒ Contain the spill by isolating and immobilizing the spill. Construct containment ditches and berms or place absorbent material in front of flowing material.

⇒ Estimate the volume of material that was spilled.

⇒ The Plant Manager must determine if the regulatory agencies need to be notified. If a reportable quantity of a substance has been spilled (see Table C-1 in Appendix C for reportable quantities), the Plant Manager will notify the Corporate Environmental Group and s/he will make the required notifications.

10.2.2 Spill Cleanup Procedures

⇒ Clean up the spilled material that has spread over a non-porous surface with absorbent material such as oil-dry or absorbent socks or booms. Collect cleanup materials (*e.g.*, oil-dry, absorbent socks or booms) and place them in leak-proof containers.

⇒ For spills on gravel or soil, absorb as much of the liquid as possible with absorbent material and excavate the contaminated gravel or soil down to visibly clean material. Place the excavated material in piles for temporary storage.

10.2.3 Disposal Procedures

A spill is not considered cleaned up until all waste produced during the cleanup activities are properly disposed of. The Plant Engineer is responsible for disposing of contaminated cleanup materials in accordance with federal, state, and local regulations. The Corporate Environmental Group can provide assistance in determining how to dispose of cleanup materials since the method of disposal may vary depending on the substance that was spilled.

10.2.4 Follow-up Response Actions

⇒ Complete the Spill Report Form for all reportable spills.

⇒ Conduct an investigation as needed to:

- Determine the cause of the spill;
- Review the response actions that were taken to identify any improvements for response to future incidents; and,
- Determine if any measures need to be implemented to prevent another spill.

⇒ Review this SWPPP to identify measures to prevent the reoccurrence of the release and to respond to such releases and modify the plan as needed within 14 calendar days of knowledge of the release.

⇒ Replace all spill cleanup equipment that was used during the cleanup of the spill.

10.3 SPILL REPORTING REQUIREMENTS

This section outlines the spill reporting requirements for chemical, hazardous substance, and petroleum product spills. A call list with contact names and telephone numbers is location in Table 5. Table 6 at the end of Section 10.3 summarizes the spill reporting information outlined in Sections 10.3.1 through 10.3.4.

10.3.1 Internal Reporting Requirements

When a person discovers one of the following spills, that person must report the spill to their Supervisor:

- A chemical, hazardous waste, or petroleum product spill of any size that poses a threat to human health or the environment;
- A chemical or hazardous waste spill greater than or equal to 1 pound outside secondary containment or a building;
- An oil spill greater than 2 gallons outside secondary containment or a building;
- An oil spill less than 2 gallons outside a secondary containment or a building that is not immediately cleaned up;
- An oil spill equal to or greater than 25 gallons inside secondary containment.

The Supervisor must then notify the Plant Manager. If the Supervisor cannot be located, the person who discovered the spill must then notify the Plant Manager directly.

The Plant Manager must determine if the spill is a reportable spill or contact the Corporate Environmental Group for assistance. If the spill is reportable, then the Plant Manager must notify the Corporate Environmental Group of the spill. A Spill Report Form must be completed for all reportable spills. A blank form is location in Appendix A. Completed forms will be maintained in Appendix B.

10.3.2 Federal Reporting Requirements

The Plant Manager or his/her designated representative will determine if a spill must be reported to a federal agency. If the spill is determined to be reportable, the Plant Manager must notify the Corporate Environmental Group and they will complete the required notifications. Federal reporting requirements are outlined below.

National Response Center (NRC)

Immediately report to the NRC any spill of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance that has been spilled in a quantity that equals or exceeds its reportable quantity and has occurred or migrated beyond the confines of an enclosed structure (*i.e.*, outside a building or containment area). Table C-1 in Appendix C contains a list of reportable quantities for the materials used at the Cricket Mountain Plant.

United States Fish and Wildlife Service (USFWS)

Immediately notify the Spill Response Coordinator at the USFWS Utah field office if a chemical or oil spill impacts, or has the potential to impact, endangered species or waterfowl.

10.3.3 State Reporting Requirements

The Plant Manager or his/her designated representative will determine if a spill must be reported to a state agency. If the spill is determined to be reportable, the Plant Manager must notify the Corporate Environmental Group and they will complete the required notifications. State reporting requirements are outlined below.

Utah Department of Environmental Quality (UDEQ)

Immediately notify the UDEQ of used oil spills that are greater than 25 gallons or are a potential threat to human health or the environment. Submit a written report to the Executive Secretary of UDEQ within 15 days after a release of used oil that was reported verbally to UDEQ.

Utah Division of Water Quality (DWQ)

Immediately notify the DWQ for oil spills that are a potential threat to human health or the environment. The verbal notification must include the substance that was spilled, the actions taken, the cleanup procedures that were or will be implemented, and the facility's plan for disposal of any contaminated cleanup materials.

Immediately report any oil spill or spill of a CERCLA hazardous substance that has been spilled in a quantity that equals or exceeds its reportable quantity and the release occurred or migrated beyond the confines of an enclosed structure (*i.e.,* outside a building or containment area) to the DWQ. Table C-1 in Appendix C contains a list of reportable quantities for the materials used at the Cricket Mountain Plant. Submit a written report to the Executive Secretary of the DWQ within 14 calendar days of knowledge of the release. The report must contain 1) a description of the release (including type and estimate of the amount of material released), 2) the date that such release occurred, 3) the circumstances leading to the release, and 4) any modifications that were, or will be, made to this plan.

Utah Division of Solid and Hazardous Waste (DSHW)

Immediately report (verbal notification) a spill of non-acute hazardous waste or material, which, when spilled, becomes a hazardous waste, that equals or exceeds 220 pounds or any spilled amount that poses a threat to human health or the environment to the DSHW.

Immediately report a spill of acute hazardous waste that equals or exceeds 2.2 pounds or any spilled amount that poses a threat to human health or the environment to the DSHW.

Submit a written report to the Executive Secretary of the DSHW within 15 days after a spill that was reported verbally to the DSHW.

State Emergency Response Commission (SERC)

Immediately notify the SERC if a CERCLA hazardous substance or Emergency Planning and Community right-to-Know Act (EPCRA) extremely hazardous substance (EHS) has been spilled in a quantity that equals or exceeds its reportable quantity and the release occurred or migrated beyond the legal boundary of the facility. Provide written follow-up notices to the SERC as soon as practicable after a release that was reported verbally and as more information becomes available.

Utah Division of Environmental Response and Remediation (UDERR)

Immediately make a verbal notification to UDERR of any oil spills that are not contained within a secondary containment area or a building.

For spills that occur within secondary containment areas, UDERR recommends that they be notified as a courtesy. Since the notification is made as a courtesy, the notification can be made within 24 hours of discovery.

10.3.4 Local Reporting Requirements

If a CERCLA hazardous substance or EPCRA EHS has been spilled in a quantity that equals or exceeds its reportable quantity and the release occurred or migrated beyond the legal boundary of the facility, immediately notify the LEPC or the relevant local emergency response personnel of all communities affected by the release. Provide written follow-up notices to the LEPCs or local emergency response personnel as soon as practicable after the release and as more information becomes available.

Table 5: Spill Contact Information

CONTACT NAMES	CONTACT INFORMATION
Facility Contacts:	
• Plant Manager • Plant Superintendent/Assistant Plant Manager • Plant Engineer	• Facility No.: (435) 864-3823 • See the Plant Telephone Directory for extension numbers and cell phone numbers.
Corporate Environmental Group:	
• Vice President of Environmental Affairs • Senior Environmental Engineer • Environmental Engineer	• Corporate No.: (801) 262-3942 • See the Corporate Telephone Directory for extension numbers and cell phone numbers.
Federal Agency Contact Numbers:	
• National Response Center (NRC)	• (800) 424-8802
• U.S. Fish and Wildlife Service (USFWS) – Spill Response Coordinator	• (801) 975-3330
State Agency Contact Numbers:	
• Utah Division of Water Quality (UDWQ)	• (801) 536-6146 (801) 536-4123 – after hours
• Utah Division of Emergency Response and Remediation (UDERR)	• (801) 536-4123
• Utah Division of Solid and Hazardous Waste (UDSHW)	• (801) 538-6170 (801) 536-4123 – after hours
• State Emergency Response Commission	• (801) 536-4123
Local Agency Contact Numbers:	
• Local Fire Department	• 911
• Millard County LEPC (Millard County Sheriff's Office)	• (435) 743-5302

Table 6: Spill Reporting Table

MATERIAL SPILLED	QUANTITY SPILLED	SPILL AREA	WHEN TO REPORT	REPORT TYPE	WHO REPORTS SPILL	REPORT SPILL TO
Any chemical or hazardous waste	Any amount	Any location where spill poses a threat to human health or the environment	Immediately	Verbal Notification	Person who discovered spill	Internal[1]
	> or = 1 pound	Outside secondary containment or a building				
Petroleum products, including used oil	Any amount	Any location where spill poses a threat to human health or the environment, including wildlife and birds	Immediately	Verbal Notification	Person who discovered spill	Internal[1]
	>2 gallons or <2 gallons if not immediately cleaned up	Outside secondary containment or building				
	= or >25 gallons	Inside secondary containment or building				
CERCLA hazardous substance (see Appendix C)	= or > reportable quantity	Outside secondary containment or building	Immediately	Verbal Notification	Corporate Env. Group	NRC & DWQ
			Within 14 calendar days	Written Report	Corporate Env. Group	DWQ
CERCLA haz sub or EPCRA EHS (see Appendix C)	= or > reportable quantity	Occurred or migrated beyond the legal boundary of the facility	Immediately	Verbal Notification	Corporate Env. Group	SERC & LEPC
			As soon as practicable	Written Report		
Any chemical or petroleum product	Any amount	Any location where a spill impacts, or has the potential to impact, endangered species or waterfowl	Immediately	Verbal Notification	Corporate Env. Group	USFWS
Non-acute hazardous waste	= or > 220 pounds	Anywhere	Immediately	Verbal Notification	Corporate Env. Group	DSHW
			Within 15 days	Written Report		
	Any amount	Any location where spill poses a threat to human health or the environment	Immediately	Verbal Notification	Corporate Env. Group	DSHW
			Within 15 days	Written Report		
Acute hazardous waste	= or > 2.2 pounds	Anywhere	Immediately	Verbal Notification	Corporate Env. Group	DSHW
			Within 15 days	Written Report		
	Any amount	Any location where spill poses a threat to human health or the environment	Immediately	Verbal Notification	Corporate Env. Group	DSHW
			Within 15 days	Written Report		
Used oil	>25 gallons	Any location	Immediately	Verbal Notification	Corporate Env. Group	UDEQ
			Within 15 days	Written Report		
	Any amount	Any location where the spill is a potential threat to human health or the environment	Immediately	Verbal Notification	Corporate Env. Group	UDEQ
			Within 15 days	Written Report		
Petroleum product	Any amount	Any location where the spill is a potential threat to human health or the environment	Immediately	Verbal Notification	Corporate Env. Group	UDWQ
	Large spills[2]	Any location where a spill is not contained within secondary containment or building	Within 24 hours of discovery	Verbal Notification (courtesy call)	Corporate Env. Group	UDERR

NOTES:
(1) Internal reporting requires that the Supervisor or Plant Manager, if the Supervisor is unavailable, be notified of a spill.
(2) UDERR does not define what is considered a 'large' spill. Spill location, the receiving environment, and injuries or environmental damage must be taken into consideration. Check with the Corporate Environmental Group to determine if a large spill (typically greater than 10 gallons) needs to be reported to UDERR.

11.0 NON-STORM WATER DISCHARGES

The Cricket Mountain Plant (Processing Plant and Quarry) was evaluated for the presence of non-storm water discharges on April 8, 2004. Sources of non-storm water at the Cricket Mountain Plant include:

- Water used in the wet scrubber
- Dust control at the Quarry and Processing Plant
- Vehicle wash water

Water used during limestone processing operations is conveyed to a concrete-lined settling pond and is subsequently reused in plant operations. The setting pond is located below grade and water is contained in the pond or transfer piping. Quarry and plant vehicles are washed in an area next to the Maintenance Shop in the Processing Plant. The wash water collects in this area and does not exit the site. Water sprays are used to control fugitive dust at conveyor transfer points in the Quarry and Processing Plant. The water sprayed out soaks into the material that is being conveyed. Over spray may be transported by the wind; however, this is fresh water and the quantity of over spray is low enough that it soaks into the ground or evaporates.

The Quarry and the Processing Plant were observed on April 8, 2004 for evidence of non-storm water discharges since storm water discharges from the Quarry and Processing Plant were not present. Evidence of flowing water past the facility boundary would indicate that non-storm water discharges were inadvertently occurring. The evaluation consisted of observing facility boundaries, non-storm water sources, and their surrounding areas to determine if water was being discharged from the facility or areas surrounding the non-storm water sources. The result of the evaluation was that the areas surrounding the non-storm water sources were dry, no discharges from the facility were observed, and no evidence of prior discharges was found. Therefore, non-storm water is not being discharged from the Cricket Mountain Plant.

The certification in Section 16 certifies that the evaluation was performed and the results are as indicated.

12.0 INSPECTIONS

Inspections, monitoring, and reporting required by this SWPPP and the General Permit are described in the following sections.

12.1 QUARTERLY VISUAL INSPECTIONS

The Plant Engineer will conduct quarterly visual inspections of the Cricket Mountain Plant (Quarry and Processing Plant). The inspections will be performed in accordance with Appendix II.J.3.1.(3)(4). The inspections will be documented on the form contained in Appendix A. Completed inspection forms will be maintained in Appendix D.

If corrective or preventive action is warranted, the Plant Engineer will notify the Plant Manager. The Plant Engineer will write a work order as needed and repairs will be scheduled accordingly. Corrective or preventive actions taken will be documented on the inspection form. If modifications to this SWPPP are required as a result of the inspection, the Plant Engineer will complete the required changes and document them on the SWPPP Revision Log in Appendix H.

One inspection must take place during each calendar quarter. The inspections are to be performed during daylight hours when rainfall or snowmelt produces runoff. If the rainfall or snowmelt is insufficient to produce runoff, indicate that on the inspection form and complete the inspection while rain is falling or snow is melting. If no rainfall or snowmelt occurs, perform the inspection during dry weather.

12.2 COMPREHENSIVE SITE COMPLIANCE EVALUATION

The Plant Engineer will conduct a Comprehensive Site Compliance Evaluation at least once per year as required by the General Permit, Appendix II.J.3.1.(4). The annual inspection will include:

- Visual inspection of areas which may contribute to storm water contamination;
- Evaluation of measures to reduce pollutant loadings to determine whether they are adequate and properly implemented;
- Visual inspection of equipment needed to implement plan (i.e., spill response equipment); and,
- Visual inspection to ensure that structural storm water management and erosion control measures are operating correctly.

The Annual Comprehensive Site Compliance Evaluation Checklist and Report (Appendix A) will be used for the evaluation. Based on the results of the evaluation, discrepancies in the SWPPP will be evaluated and revised as appropriate within 2 weeks of the evaluation. Changes to the SWPPP will be documented on the SWPPP Revision Log in Appendix H. Any changes to the plan must be implemented in a timely manner, but in no case more than 12 weeks after the evaluation. The Annual Comprehensive Site Compliance Evaluation will be performed in place of one of the Quarterly Visual Inspections in accordance with Appendix II.J.3.1.(4)(4).

If no incidents of noncompliance were identified, then the report must contain a certification that the facility is in compliance with this SWPPP and the General Permit. Each report must be signed and certified by an officer or an authorized representative of the company. Completed reports will be maintained in Appendix E for at least three years from the date of the evaluation.

12.3 STORM WATER MONITORING REQUIREMENTS

12.3.1 Analytical Monitoring Requirements

During each quarter of the second and fourth years of the permit (years 2004 and 2006), if a storm water discharge from the Quarry or Processing Plant occurs, a sample will be collected from the discharge and analyzed for total suspended solids in accordance with Appendix II.J.5.1. of the General Permit. A Storm Water Discharge Monitoring Report (SWDMR) must be completed for each quarter. If no discharge occurs during a quarter, a SWDMR still must be completed; however, the 'No Discharge' box must be checked. A blank copy of the SWDMR is located in Appendix A.

Analytical monitoring results must be submitted to the UDWQ by March 31st of the year following the monitoring (years 2005 and 2007) in accordance with Part V.6.2. and Appendix II.J.5.2. of the General Permit. Copies of the completed SWDMRs will be maintained in Appendix F.

12.3.2 Coal Pile Runoff Monitoring Requirements

Storm water that contacts the coal pile typically soaks into the pile and does not runoff. In addition, the coal pile is located in a low-lying area and any storm water that falls on the area either soaks into the ground or forms puddles. No storm water is discharged from the coal pile storage area. However, if a discharge that contains runoff from the coal pile is observed, the monitoring requirements of Part V.6.3. of the General Permit will be followed. These requirements include annual sampling and analysis.

12.3.3 Quarterly Visual Examination of Storm Water Quality

A visual examination of storm water quality will be conducted quarterly in accordance with Appendix II.J.5.3. of the General Permit. Storm water samples will be collected from a discharge that results from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously-measurable (greater than 0.1 inch) rainfall event. The form in Appendix A will be used to document the examination. When rainfall or snowmelt is insufficient to produce a discharge, a form must still be completed and the reason why a sample was not collected must be indicated. The SWDMR will be used to record the examination in years 2004 and 2006 when analytical monitoring is required. Completed forms will be maintained in Appendix G.

13.0 EMPLOYEE TRAINING

The Plant Engineer will conduct annual training sessions for employees who are responsible for implementing activities identified in this plan or are involved with storm water management at all levels of responsibility. Training will consist of the components in this plan and the trainee's responsibilities under this plan. Training topics may include, but are not limited to, equipment operation, spill prevention and response, good housekeeping techniques, proper material handling procedures, inspections, recordkeeping, and reporting procedures.

14.0 RECORDKEEPING

All monitoring information, copies of all reports and inspections required by the SWPPP and General Permit, and records of all data used to complete the application must be retained for a period of at least 3 years from the date of the sample, evaluation or inspection, report, or application. Monitoring records must contain the information listed in Part VI.16. of the General Permit.

This SWPPP must be retained at least 3 years after the last modification or amendment was made to the plan and at least 1 year after coverage under the General Permit terminates. A copy of the plan must be maintained at the Cricket Mountain Plant.

15.0 SWPPP REVISION

This plan must be amended whenever a change in the design, construction, operation, or maintenance occurs that has a significant effect on the potential for the discharge of pollutants into storm water or the plan has not achieved the general objective of controlling pollutants in storm water. Plan revisions will be documented on the log contained in Appendix H.

16.0 SWPPP CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: [signature] Date: 12/27/04

Title: PLANT MANAGER

Appendix A

Blank Forms:

- *Spill Report Form*
- *Quarterly Visual Inspection Form*
- *Annual Comprehensive Site Compliance Evaluation Checklist*
- *Storm Water Discharge Monitoring Report*
- *Quarterly Visual Examination of Storm Water Quality Form*

GRAYMONT WESTERN US INC.	**SPILL REPORTING FORM** FACILITY NAME:__________ SPILL DISCOVERED BY:__________ TITLE:__________ PERSON REPORTING SPILL:__________ TITLE:__________

SPILL REPORTING INFORMATION

WHO WAS NOTIFIED OF THE SPILL? ☐ Supervisor ☐ Plant Manager ☐ Corporate Environmental Group

☐ Other:__________

SPILL INFORMATION

DATE OF SPILL:__________ TIME:__________ DURATION OF INCIDENT:__________(hours)

DATE SPILL WAS DISCOVERED:__________ TIME:__________

MATERIAL SPILLED:__________ CONCENTRATION OF MATERIAL (if known):__________

ESTIMATED QUANTITY SPILLED:__________(gallons)

WAS A REPORTABLE QUANTITY SPILLED? ☐ YES ☐ NO ☐ N/A – spilled material does not have a reportable quantity

AMOUNT RECOVERED:__________(gallons) AMOUNT UNRECOVERED:__________(gallons)

ESTIMATED QUANTITY THAT WAS RELEASED OR MIGRATED OFFSITE:__________(gallons)

ESTIMATED QUANTITY THAT HAS, OR HAS THE POTENTIAL, TO ENTER WATERS OF THE STATE OR U.S.:__________(gallons)

NAME OF WATER BODY:__________

SPILL WAS RELEASED INTO OR ON TO (land, water, air, secondary containment, etc.):__________

EXACT LOCATION OF THE SPILL (include type of terrain, nearest waters or drains, etc.):__________

IF OUTSIDE OF SECONDARY CONTAINMENT, WHICH DIRECTION DID THE SPILL TRAVEL?__________

WEATHER CONDITIONS:__________

SOURCE OF THE SPILL:__________

CAUSE OF THE SPILL (include equipment or activities involved in the spill):__________

ACTIONS TAKEN TO CONTAIN THE SPILL:__________

SPILL REPORTING FORM (CONTINUED)

HAZARD/DAMAGE INFORMATION *(check with the Corporate Environmental Group prior to completing this section)*

IDENTIFY HAZARDS TO HUMAN HEALTH OR ENVIRONMENT POSED BY SPILLED MATERIAL: ______________________

____

PRECAUTIONS THAT HAVE BEEN OR ARE BEING TAKEN: ______________________

____

____

LIST PERSONAL INJURIES, ENVIRONMENTAL DAMAGE, OR PROPERTY DAMAGE CAUSED BY THE SPILL (environmental damage includes impacts to wildlife, wetlands, or other environmental resources): ______________________

____

____

EVACUATION NEEDED? ☐ YES ☐ NO IF YES, DESCRIBE ACTIONS TAKEN: ______________________

____

____

SPILL CLEANUP & DISPOSAL INFORMATION

OUTSIDE CONTRACTOR USED FOR SPILL CLEAN UP? ☐ YES ☐ NO IF YES, WHO? ______________________

CLEAN UP ACTIONS TAKEN OR TO BE TAKEN: ______________________

____

____

EFFECTIVENESS OF CLEANUP ACTIVITIES: ______________________

____

METHOD(S) OF DISPOSAL OF SPILL CLEANUP MATERIAL(S): ______________________

____

____

SPILL FOLLOW-UP

CORRECTIVE ACTION(S) TAKEN OR TO BE IMPLEMENTED TO PREVENT FUTURE OCCURRENCES: ______________________

____

____

____

WAS THE SPCC PLAN REVIEWED AFTER THIS SPILL (applies to oil spills only)? ☐ YES ☐ NO ☐ N/A

DOES THE SPCC PLAN REQUIRE MODIFICATION (applies to oil spills only)? ☐ YES ☐ NO ☐ N/A

IF YES, DATE MODIFICATIONS WERE COMPLETED: ______________________

WAS THE SWPPP REVIEWED AFTER THIS SPILL? ☐ YES ☐ NO ☐ N/A

DOES THE SWPPP REQUIRE MODIFICATION? ☐ YES ☐ NO ☐ N/A

IF YES, DATE MODIFICATIONS WERE COMPLETED: ______________________

SIGNATURE: **DATE:**

GRAYMONT WESTERN US INC.	**QUARTERLY VISUAL INSPECTION FORM** FACILITY NAME:__________ INSPECTOR'S NAM E:__________ INSPECTION DATE:__________ INSPECTION TIME:__________

INSPECTION PERFORMED DURING: ☐ DRY WEATHER ☐ WET WEATHER ☐ RUNOFF EVENT

IF INSPECTION IS PERFORMED WHEN RUNOFF IS NOT OCCURRING, INDICATE REASON:

☐ INSUFFICIENT RAINFALL OR SNOWMELT TO PRODUCE RUNOFF. ☐ OTHER:__________

INSTRUCTIONS:

1. Perform a walk-through of the Processing Plant and Quarry. Check off all items that are inspected. Items listed below apply to both the Processing Plant and Quarry.
2. Record any maintenance that is needed, corrective actions taken, and date when maintenance was performed. If additional space is needed, use the *Maintenance Required/Corrective Actions* section on Page 2.
3. Complete the *SWPPP Revisions* section.

HOUSEKEEPING	***MAINTENANCE REQUIRED/CORRECTIVE ACTIONS TAKEN***
☐ Proper disposal of litter and windblown trash.	
☐ Proper storage or disposal of empty drums and containers.	
☐ Condition of trash dumpsters.	

EQUIPMENT AND MATERIAL STORAGE	***MAINTENANCE REQUIRED/CORRECTIVE ACTIONS TAKEN***
☐ Concrete dikes and pads (good condition, no accumulations of oil or fuel, etc.).	
☐ Oil or fuel dispensing stations (good condition, no spillage or accumulations of oil or fuel, etc.).	
☐ New drums and containers (stored properly, in good condition, labeled, lids in place, etc,).	
☐ Drums and containers in use (stored properly, in good condition, labeled, lids in place, etc,).	
☐ Obsolete and unused equipment (located in proper storage areas, no signs of leakage, etc.).	
☐ Storage tanks and raw material containers (in good condition, no signs of leaks, no severe rust or damage, etc.).	

BMPs (Structural and Non-structural)	***MAINTENANCE REQUIRED/CORRECTIVE ACTIONS TAKEN***
☐ Berms (structures are intact, no erosion or washouts, material stored does not extend beyond berm, operating correctly, etc.): - Quarry haul roads - Outer edge of quarry floors - North & east sides of coal stockpile - North side of West Kiln Dust and Limestone Fines stockpile - Berm around obsolete & unused equipment storage area	
☐ Slope of ground in the area surrounding the: - Crushing and Screening Area - Maintenance Shop Area in Quarry - Maintenance Shop Area in Processing Plant	
☐ Catch basins along quarry roads (in good condition, entrance to basin is free of obstructions, no debris in basins, etc.).	
☐ North Kiln dust and Limestone Fines stockpile (stockpiled material located below grade).	

QUARTERLY VISUAL INSPECTION FORM *(continued)*

GENERAL	MAINTENANCE REQUIRED/CORRECTIVE ACTIONS TAKEN
☐ Unpaved roads and surfaces (in good condition, no erosion or ruts).	
☐ Any evidence of storm water discharge.	
☐ Quarry and Processing Plant boundaries (should be dry during dry weather inspections).	
☐ Identification of new problem areas or potential pollutant sources.	
☐ Spill response equipment available.	

SWPPP REVISIONS

If deficiencies were noted above, are additional measures required to reduce pollutant loadings? ☐ YES ☐ NO

If deficiencies were noted above, are modifications to the SWPPP required? ☐ YES ☐ NO

If yes, record the revisions on the log contained in Appendix H in the SWPPP.

ASSESSMENT

Provide an assessment of the integrity of storm water discharge diversions, sediment control and collection systems, and containment structures: ______________________________

____

____

____

____

____

MAINTENANCE REQUIRED/CORRECTION ACTIONS TAKEN *(additional explanation)*

Provide additional information on Maintenance Required/Corrective Actions Taken, if necessary.

____

____

____

____

____

____

____

GRAYMONT WESTERN US INC.	**ANNUAL COMPREHENSIVE SITE COMPLIANCE EVALUATION CHECKLIST AND REPORT** FACILITY NAME: ______ INSPECTOR'S NAM E: ______ INSPECTION DATE: ______ INSPECTION TIME: ______

SCOPE OF THE EVALUATION:

- Visually inspect the areas that may contribute to storm water contamination.
- Evaluate measures to reduce pollutant loadings to determine whether they are adequate and properly implemented.
- Visually inspect equipment needed to implement SWPPP.
- Observe structural storm water management measures, sediment and erosion control measures, and other structural pollution prevention measures to ensure proper operation.
- Confirm accuracy of the description of potential pollutant sources contained in the SWPPP.
- Determine effectiveness of the SWPPP.
- Assess compliance with the terms and conditions of the permit.

1. Perform a walk-through of the Processing Plant and Quarry. Inspect the following BMPs (ensure BMPs are in good condition) and areas (inspect loading/unloading areas, housekeeping, container management, for signs of leaks or spills, etc.). Place one of the following marks on each line:

   √ = Satisfactory   X = Corrective action or maintenance required

   If corrective action or maintenance is required, record the actions taken or maintenance performed below.

QUARRY	PROCESSING PLANT
____ Quarry floors (berms, slope of floor)	____ Oil and fuel tanks & containment dikes
____ Quarry haul roads (berms, no erosion or ruts, etc.)	____ Fuel dispensing station
____ Catch basins along haul roads	____ Maintenance Shop & container storage areas
____ Crushing & Screening Area, including stockpiles	____ Coal stockpile (berms, slope of surrounding area)
____ Maintenance Area & container storage areas	____ Kiln Dust & Limestone Fines stockpiles
____ Oil and fuel tanks & containment dikes	____ Road surfaces (no erosion or ruts)
____ Fuel dispensing station	____ Raw material & product storage & unloading/loading areas
____ Obsolete & unused equipment storage areas	____ Obsolete & unused equipment storage areas
____ Trash dumpsters & receptacles	____ Trash dumpsters & receptacles
____ Spill response equipment	____ Spill response equipment
☐ Inspect for erosion on the roads or in the Processing Plant during the walk-through.	If problems were observed, explain:
☐ Inspect for new storm water contaminants or pollutant sources during the walk-through.	If new contaminants or pollutant sources were identified, explain:
☐ Determine if any additional measures are required to reduce pollutant loadings during the walk-through.	If additional measures are required, explain:

Record corrective actions taken and any maintenance that was performed to assure adherence to the SWPPP:

______

______

______

______

______

______

ANNUAL COMPREHENSIVE EVALUATION CHECKLIST AND REPORT (continued)

2. Review the SWPPP and the Storm Water Permit. If revisions are required, record the revisions on the log in Appendix H of the SWPPP.

Have the BMPs in the SWPPP been effective at minimizing storm water runoff and contamination? ☐ YES ☐ NO	If no, explain:
Have the structural and non-structural BMPs in the SWPPP been correctly implemented and maintained? ☐ YES ☐ NO	If no, explain:
Were deficiencies in the SWPPP identified? ☐ YES ☐ NO	If yes, explain:
Any components of the SWPPP no longer apply or are incorrect? ☐ YES ☐ NO	If yes, explain:
Are the descriptions in the material inventory (Table 2) and of the potential pollutant sources (Table 3) correct? ☐ YES ☐ NO	If no, explain:

3. Record any additional major observations relating to the implementation of the SWPPP that were made during the Annual Evaluation:____

4. Incidents of Noncompliance:
   Were any incidents of noncompliance observed? ☐ Yes ☐ No

If yes, list the incidents and corrective actions taken or to be taken:____________________________

5. Certification:

   If the evaluation did not identify any incidents of noncompliance, a responsible corporate officer must sign the following certification:

   > I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

____________________ ____________________
Signature Printed Name

____________________ ____________________
Title Date

STORM WATER DISCHARGE MONITORING REPORT (SWDMR)

(For additional forms copy this form or contact the DWQ)

IDENTIFICATION & LOCATION

Name ______________________________ Permit No. UTR ____________________

Mailing Address: Location *(if different)*:

______________________________ ______________________________

______________________________ ______________________________

______________________________ ______________________________

______________________________ ______________________________

Monitoring Period:

From: Month_____ Day _____ Year ______ To: Month_______ Day _____ Year ______

Total Storm Water Discharge Points___________ Number assigned to this Discharge Point________

INDUSTRY SECTORS:

Industrial Activities or Industry Sector(s) Drained by this Discharge:

- A. Timber Products Facilities
- B. Paper and Allied Products Manufacturing Facilities.
- C. Chemical and Allied Products Manufacturing Facilities.
- D. Asphalt Paving, Roofing Materials, and Lubricant Manufacturing Facilities.
- E. Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturing Facilities.
- F. Primary Metals Facilities.
- G. Metal Mines (Ore Mining and Dressing).
- H. Coal Mines and Coal Mine-Related Facilities.
- I. Oil or Gas Extraction Facilities.
- J. Mineral Mining and Processing Facilities.
- K. Hazardous Waste Treatment Storage or Disposal Facilities.
- L. Landfills and Land Application Sites.
- M. Automobile Salvage Yards.
- N. Scrap Recycling and Waste Recycling Facilities.
- O. Steam Electric Power Generating Facilities.
- P. Motor Freight Transportation Facilities, Passenger Transportation Facilities, Petroleum Bulk Oil Stations and Terminals, the United States Postal Service, or Railroad Transportation Facilities.
- Q. Vehicle Maintenance Areas and Equipment Cleaning Areas of Water Transportation Facilities.
- R. Ship or Boat Building and Repair Yards.
- S. Vehicle Maintenance Areas, Equipment Cleaning Areas or Airport Deicing Operations located at Air Transportation Facilities.
- T. Wastewater Treatment Works.
- U. Food and Kindred Products Facilities.
- V. Textile Mills, Apparel and other Fabric Product Manufacturing Facilities.
- W. Furniture and Fixture Manufacturing Facilities.
- X. Printing and Publishing Facilities.
- Y. Rubber and Miscellaneous Plastic Product Manufacturing Facilities.
- Z. Leather Tanning and Finishing Facilities.
- AA. Facilities that Manufacture Metal Products including Jewelry, Silverware and Plated Ware.
- AB. Facilities that Manufacture Transportation Equipment, Industrial or Commercial Machinery.
- AC. Facilities That Manufacture Electronic and Electrical Equipment and Components, Photographic and Optical Goods.
- AD. Non-Classified Facilities.

ANALYTICAL MONITORING DATA *(For sectors where it is required)*

Storm Event: All samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. This data must be submitted to the Division of Water Quality.

Date of Storm Event	Month Day Year
Duration of Storm Event	Hours
Rain Fall Measurement	Inches
Time Elapsed Between Recorded & Previous Storm Event	Days
Estimated Total Volume of Discharge *(Include units: gal., ft^3, etc.)*	
Please check if there has been no discharge of Storm Water during this reporting period. (If none, please explain in comment section).	☐ No Discharge

Sample Type: Data shall be reported for a grab sample taken during the first thirty minutes of the discharge. If the collection of a grab sample during the first thirty minutes is impracticable, a grab sample can be taken during the first hour of the discharge, and the discharger shall submit with the monitoring report a description of why a grab sample during the first thirty minutes was impracticable.

Parameter	Effluent Limit *(if applicable)*	Concentration *(Concentration quantity, for example - 14.2)*	Units *(Example – mg/L)*

SIGNATURE

Name/Title Principle Executive Officer
(Typed or Printed)

____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. 1001 and 33 U.S.C. 1319 (penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.).

_______________________________ _______________________

Signature of Principle Executive Officer or Authorized Agent

Date

Comments:

VISUAL MONITORING REQUIREMENTS

Sample and Data Collection: *Examinations shall be made of samples collected within the first 30 minutes (or as soon thereafter as practical, but not to exceed one hour) of when the runoff or snowmelt begins discharging. The examinations shall document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. The examination must be conducted in a well lit area. No analytical tests are required to be performed on the samples. All such samples shall be collected from the discharge resulting from a storm event that is greater then 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where practicable, the same individual will carry out the collection and examination of discharges for the life of the permit*

COLOR (Circle the ones that apply):

1. Identification of Color:

Black	*Dark Grey*	*Medium Grey*	*Light Grey*	*Dark Chocolate Brown*	*Medium Brown*
Light Brown	*Tan*	*Yellow*	*Green*	*Other:* ______________________	

2. Intensity of Color: *Very intense* *Prominent* *Moderately Perceptible* *Hardly Perceptible*

Comments: ____

____

CLARITY (Circle the right one):

Totally Opaque *Slightly Translucent* *Translucent* *Nearly Translucent* *Transparent*

ODOR (Circle the ones that apply):

Diesel	*Gasoline*	*Petroleum*	*Solvent*	*Musty*	*Sewage*	*Chlorine*
Rotten Egg	*Sulfur*	*No Odor*	*Noxious*	*Other:* ______________________		

Comments: ____

____

SOLIDS

Floating Solids: (Description) ____

____

____

Suspended and Settled Solids: (Description) ____

____

____

FOAM, OIL SHEEN, OR OTHER OBVIOUS INDICATORS OF POLLUTION

____

____

____

GRAYMONT WESTERN US INC.	QUARTERLY VISUAL EXAMINATION OF STORM WATER QUALITY
	FACILITY NAME:______________________
	INSPECTOR'S NAM E:______________________
	INSPECTION DATE:__________ INSPECTION TIME:__________

MONITORING PERIOD: FROM: ______________(month/day/year) TO:______________(month/day/year)

DURATION OF STORM EVENT:__________HOURS **RAIN FALL MEASUREMENT:**__________INCHES

TIME ELAPSED BETWEEN RECORDED AND PREVIOUS STORM EVENT:__________DAYS

ESTIMATED TOTAL VOLUME OF DISCHARGE:__________GALLONS

TYPE OF EVENT: ☐ STORM WATER DISCHARGE ☐ SNOWMELT DISCHARGE

IF NO SAMPLE WAS TAKEN DURING THIS MONITORING PERIOD, CHECK THE APPROPRIATE BOX:

☐ NO DISCHARGE DUE TO INSUFFICIENT RAINFALL OR SNOWMELT

☐ ADVERSE WEATHER CONDITION, LIST CONDITION:______________________

SAMPLE AND DATA COLLECTION:

Examinations shall be made of samples collected within the first 30 minutes (or as soon thereafter as practical, but not to exceed one hour) of when the runoff or snowmelt begins discharging. The examinations shall document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. The examination must be conducted in a well lit area. No analytical tests are required to be performed on the samples. All such samples shall be collected from the discharge resulting from a storm event that is greater then 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where practicable, the same individual will carry out the collection and examination of discharges for the life of the permit.

COLOR (Check the ones that apply):

1. Identification of Color:
   ☐ Black ☐ Dark Grey ☐ Medium Grey ☐ Light Grey ☐ Dark Chocolate Brown ☐ Medium Brown
   ☐ Light Brown ☐ Tan ☐ Yellow ☐ Green ☐ Other:______________
2. Intensity of Color: ☐ Very intense ☐ Prominent ☐ Moderately Perceptible ☐ Hardly Perceptible

Comments:______________________

____

CLARITY (Check the right one):

☐ Totally Opaque ☐ Slightly Translucent ☐ Translucent ☐ Nearly Translucent ☐ Transparent

ODOR (Check the ones that apply):

☐ Diesel ☐ Gasoline ☐ Petroleum ☐ Solvent ☐ Musty ☐ Sewage ☐ Chlorine
☐ Rotten Egg ☐ Sulfur ☐ No odor ☐ Noxious ☐ Other:______________

Comments:______________________

____

SOLIDS:

Floating Solids: (Description)______________________

____

Suspended and Settled Solids: (Description)______________________

____

FOAM, OIL SHEEN, OR OTHER OBVIOUS INDICATORS OF POLLUTION:

____

____

Appendix B

Spill Report Forms
(Completed)

Appendix C

Reportable Quantities

Reportable Quantities

PRODUCT NAME	LISTED COMPONENTS	CONTENT IN PRODUCT	REPORTABLE QUANTITY (RQ) CERCLA HAZ. SUB.	REPORTABLE QUANTITY (RQ) EPCRA EHS	AMOUNT OF PRODUCT THAT MUST BE SPILLED BEFORE RQ IS EXCEEDED
Acetone	Acetone	100%	5,000 lbs	-	5,000 lbs
Ammonium chloride	Ammonium chloride	100%	5,000 lbs	-	5,000 lbs
Ammonium hydroxide	Ammonium hydroxide	28-30%	1,000 lbs	-	3,333 lbs
Ammonium oxalate	Ammonium oxalate	98% wt	5,000 lbs	-	5,102 lbs
Ascarite II	Sodium hydroxide	92% wt	1,000 lbs	-	1,086 lbs
Benzene	Benzene	100%	10 lbs	-	10 lbs
Bioclean	Hydrochloric acid	% unknown	5,000 lbs	-	5,000 lbs
	Phosphoric acid	% unknown	5,000 lbs	-	
Cossorbent	Sulfuric acid	% unknown	1,000 lbs	1,000 lbs	1,000 lbs
Custom Plasma Standard	Hydrochloric acid	2-5%	5,000 lbs	-	100,000 lbs
Disorbent	Potassium hydroxide	% unknown	1,000 lbs	-	1,000 lbs
Ethylbenzene	Ethylbenzene	100%	1,000 lbs	-	1,000 lbs
Formic acid	Formic acid	85-95% wt	5,000 lbs	-	5,263 lbs 522 gallons
Mercuric chloride	Mercuric chloride	100%		500 lbs	500 lbs
Methanol	Methanol	100%	5,000 lbs	-	5,000 lbs
Muriatic acid	Hydrochloric acid	9-36% wt	5,000 lbs	-	13,888 lbs
Nitric acid	Nitric acid	70%	1,000 lbs	1,000 lbs	1,428 lbs
Oxosorbent	Hydrochloric acid	% unknown	5,000 lbs	-	1 lb
	Chromous chloride	% unknown	1,000 lbs	-	
	Chromic chloride	% unknown		1 lb	
Phillips Antifreeze	Ethylene glycol	90-95%	5,000 lbs	-	5,263 lbs
Phosphoric acid	Phosphoric acid	85%	5,000 lbs	-	5,882 lbs 419 gallons
Shellzone Antifreeze	Ethylene glycol	90-97% wt	5,000 lbs	-	5,154 lbs
Sodium hydroxide	Sodium hydroxide	99-100%	1,000 lbs	-	1,000 lbs
Solvent from Scandura (Ohio) Inc.	Xylene	79% wt	1,000 lbs	-	1,265 lbs
	Ethylbenzene	9% wt	1,000 lbs	-	
Sulfuric acid	Sulfuric acid	70-100%	1,000 lbs	1,000 lbs	1,000 lbs 65 gallons
Tannergas	Methanol	72-99% wt	5,000 lbs	-	5,050 lbs
Toluene	Toluene	100%	1,000 lbs	-	1,000 lbs
Windshield Wash Concentrate	Methanol	98% wt	5,000 lbs	-	5,102 lbs
Xylene	Xylene	100%	1,000 lbs	-	1,000 lbs

Appendix D

Quarterly Visual Inspection Forms
(Completed)

Appendix E

Annual Comprehensive Site Compliance Evaluation Checklist and Report (Completed)

Appendix F

Storm Water Discharge Monitoring Report (Completed)

Appendix G

Quarterly Visual Examination of Storm Water Quality Form (Completed)

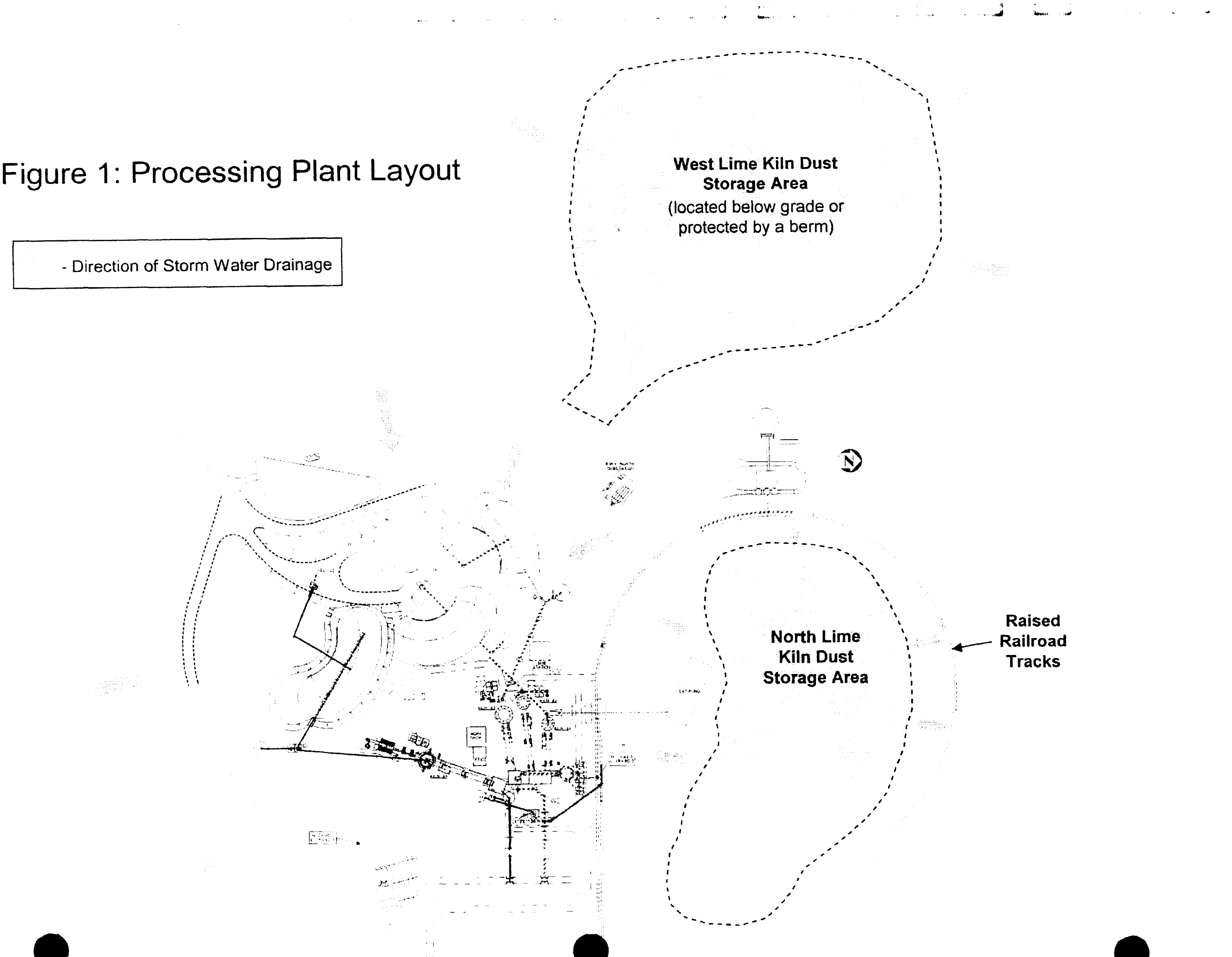
Appendix H

SWPPP Revision Log

GRAYMONT WESTERN US INC.	<u>**SWPPP REVISION LOG**</u> RECORD THE FOLLOWING INFORMATION FOR EACH REVISION MADE TO THE SWPPP.

REVISION NUMBER	DATE OF REVISION	PERSON COMPLETING REVISION	BRIEF DESCRIPTION OF THE REVISION
0	8/31/2004	Gina Rau	Revised entire SWPPP.

Figure 1: Processing Plant Layout



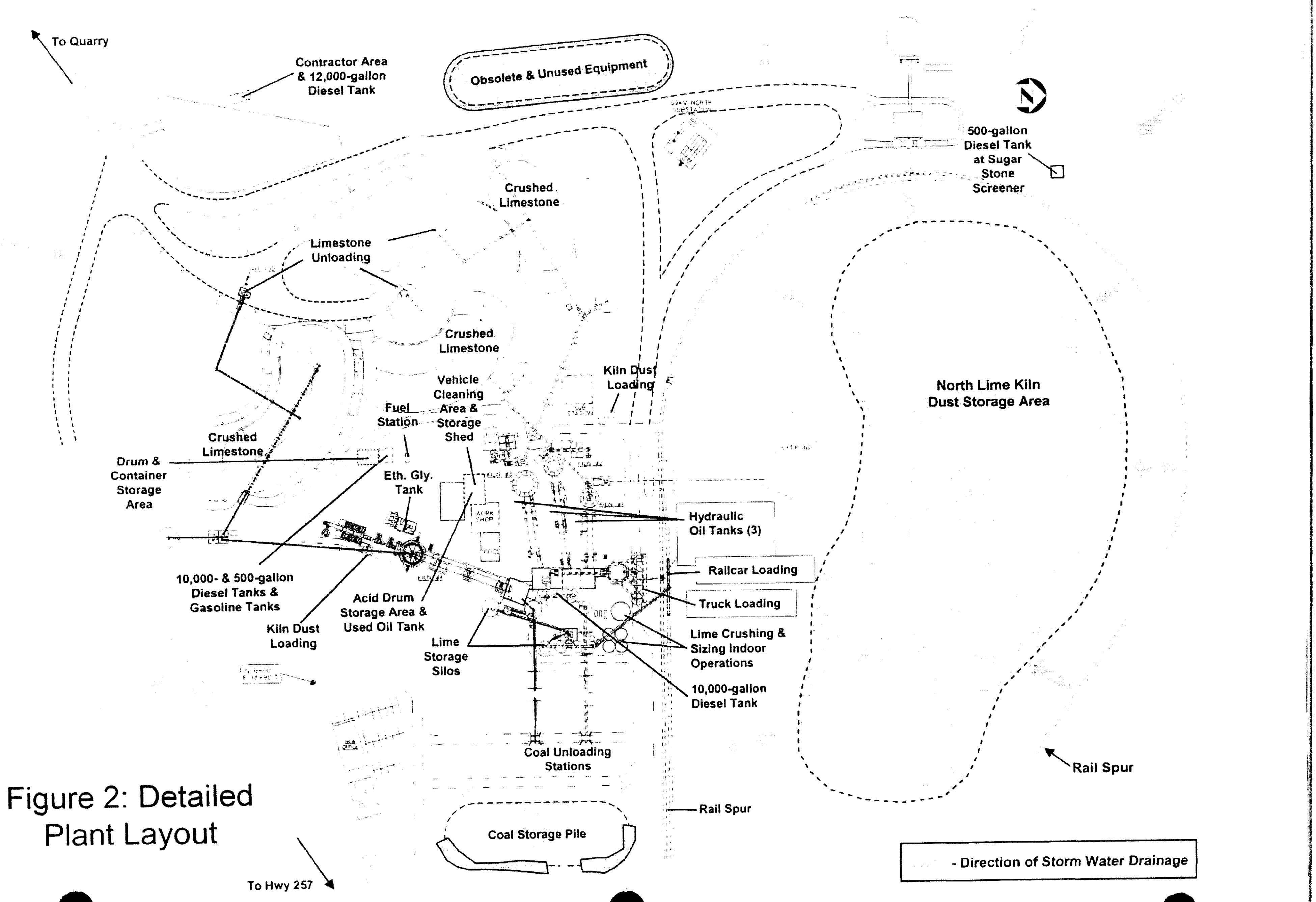


Figure 2: Detailed Plant Layout

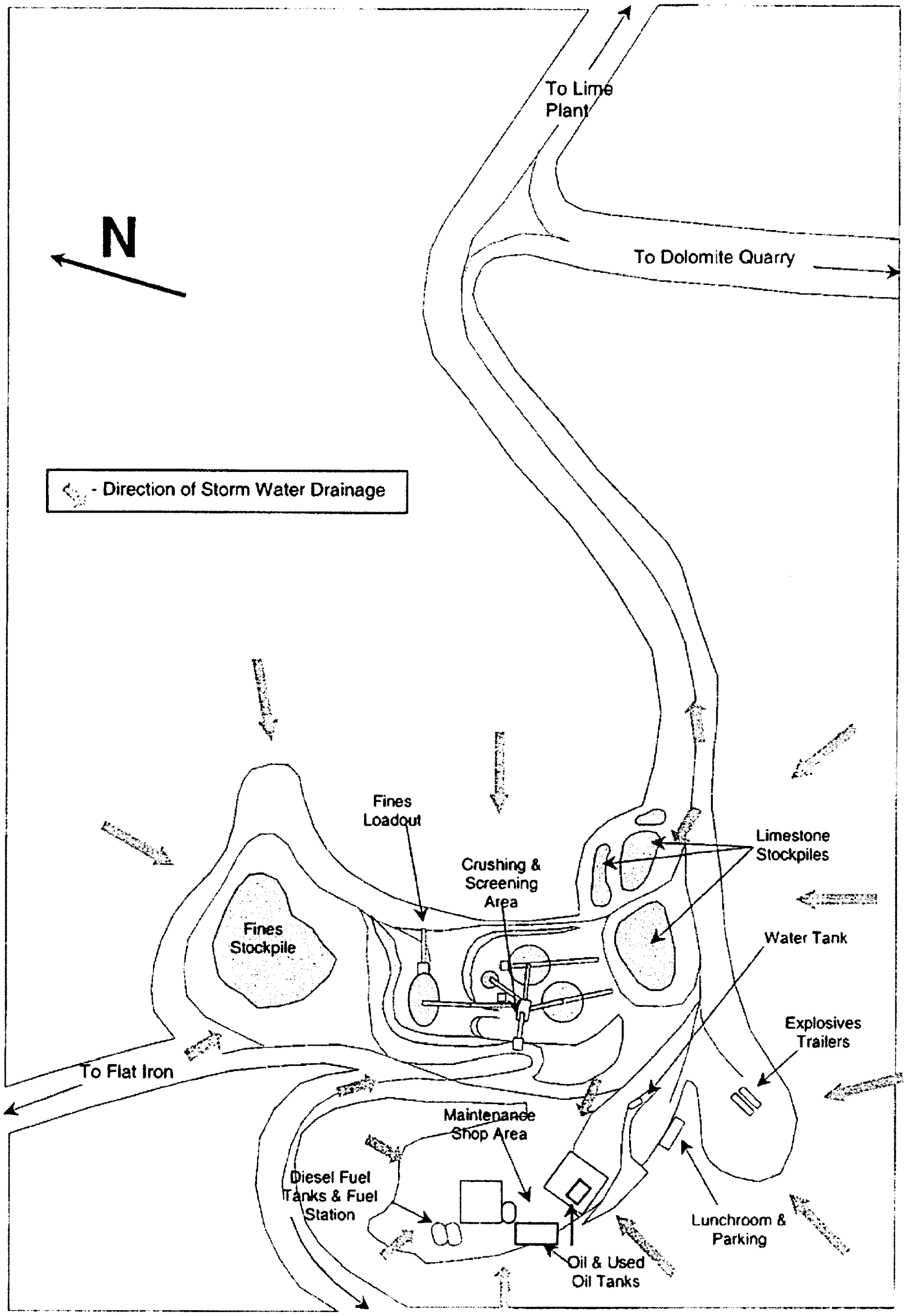
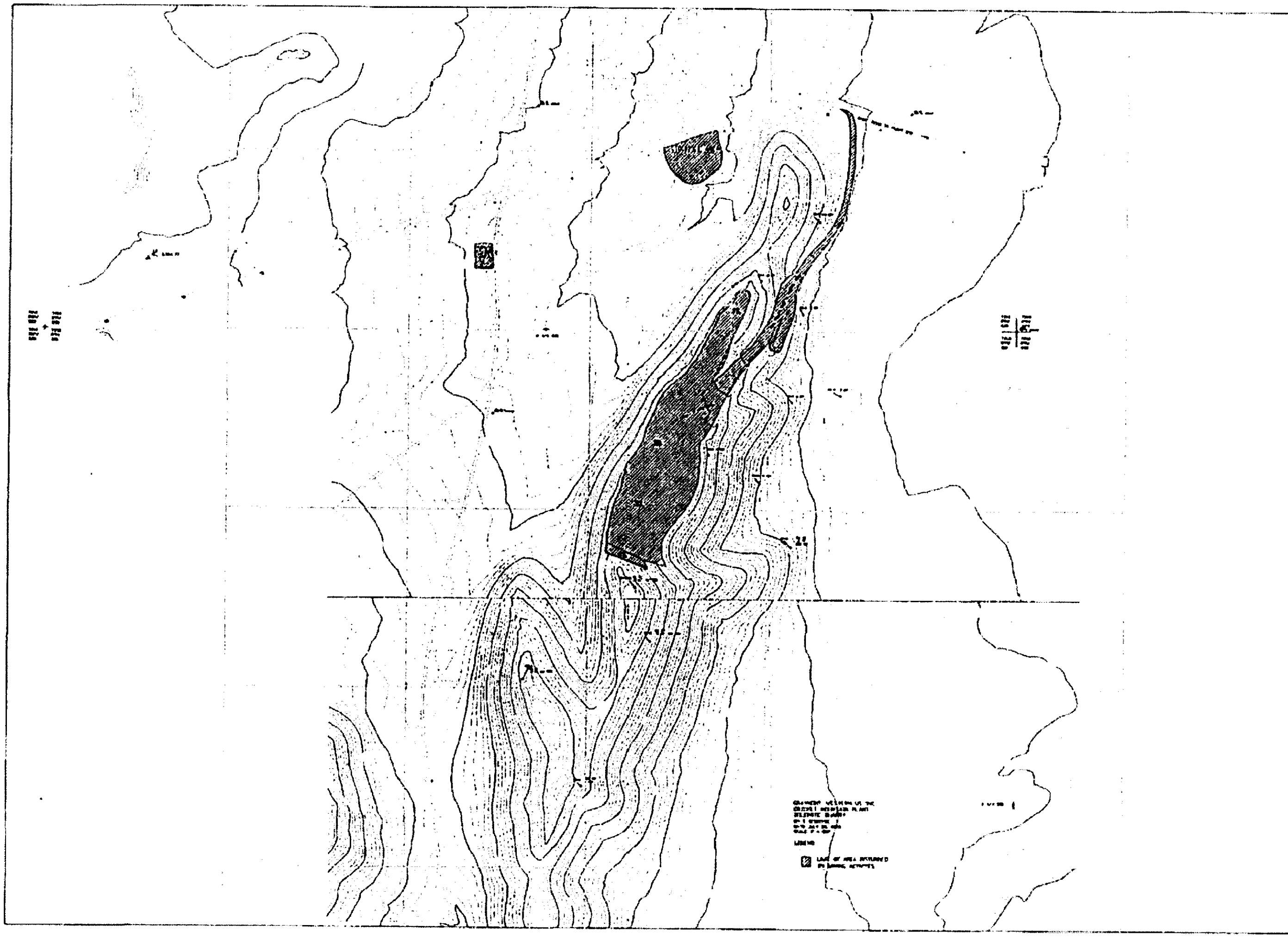


Figure 3: Crushing & Screening and Maintenance Shop Areas in Quarry


SECOR
GRAYMONT WESTERN USA INC.
CRICKET MOUNTAIN FACILITY
Figure 5
Flat Iron Quarry



SECOR

GRAYMONT WESTERN USA INC
CRICKET MOUNTAIN FACILITY

Figure 4:
Dolomite Quarry

Appendix B

Air Quality

FUGITIVE DUST CONTROL PLAN

GRAYMONT

GRAYMONT WESTERN US INC.
CRICKET MOUNTAIN PLANT
DELTA, UTAH

Revision Date: February 2, 2007

Prepared by:
Graymont Western US Inc.
3950 South 700 East, Suite 301
Salt Lake City, UT 84107

TABLE OF CONTENTS

APPENDICES

FIGURES

1.0 INTRODUCTION

The purpose of this plan is to describe dust control measures for minimizing fugitive dust which results from truck traffic along the Main Haul Road and the Sales Road at the Graymont Western US Inc. (Graymont) Cricket Mountain Plant. The Main Haul Road begins at the western edge of the Cricket Mountain Plant and ends at the Flat Iron Quarry, which is approximately 5.6 miles west of the plant. The Sales Road is located between the plant and Highway 257, which is located east of the plant.

This plan establishes the dust control measures that are technologically feasible and economically reasonable to minimize fugitive dust that is created by truck traffic along the Main Haul Road and Sales Road at the Cricket Mountain Plant. Implementation of these measures will ensure compliance with the applicable fugitive dust requirements in the Utah Administrative Rules (UAR) R307-205. Emission Standards: Fugitive Emissions and Fugitive Dust.

1.1 DUST PLAN IMPLEMENTATION

Overall, the fugitive dust from the Main Haul Road and the Sales Road represents a small fraction of the total emissions of particulate matter less than 10 microns (PM_{10}) from the Cricket Mountain Plant. The Cricket Mountain Plant is located in a remote desert area designated as attainment for all criteria pollutants. Adherence to this Fugitive Dust Control Plan will protect the public health and welfare as demonstrated by air dispersion modeling that was conducted as part of the Cricket Mountain Kiln #5 permitting project (see Cricket Mountain Plant, Notice of Intent, Kiln 5 Project, dated September 5, 2006).

Operating personnel and contractors at the Cricket Mountain Plant are responsible for implementing and documenting compliance with this plan.

1.2 WORK PRACTICES

Graymont recognizes that periods of unusual weather events such as strong winds or periods of freezing temperatures occur and some methods to control fugitive dust are less effective during these periods. Periods also occur when the established dust control measures may not be required to minimize dust because the potential for fugitive dust may be mitigated by events such as precipitation or moist conditions. However, under normal conditions, the dust control measures described in this plan will minimize fugitive dust and satisfy Graymont's requirements to comply with the applicable requirements in UAR R307-205.

1.3 SOURCE INFORMATION

Graymont Western US Inc.
Cricket Mountain Plant
32 Miles Southwest of Delta, Utah
P.O. Box 669
Delta, UT 84624

1.4 PROCESS DESCRIPTION

The Cricket Mountain Plant produces lime and limestone products for sale to the customers of Graymont Western US Inc. The process begins at the quarry where limestone is blasted and then loaded onto trucks and transported to the crusher. The crusher is located within the quarry area. Once crushed and screened, the stone is conveyed to one of four storage piles. The various storage piles are the fines pile, small stone pile, medium stone pile, and large stone pile or Sugarstone pile. From the piles, the stone is either conveyed to a truck or transferred to a truck via a front-end loader.

The haul trucks transport the crushed limestone to the plant along the Main Haul Road. Once at the plant, the haul trucks bottom dump the stone in one of three hoppers. One hopper is for stone that will be transferred to Kilns 1 and 2, the second hopper is for Kiln 3, and the third hopper is for Kiln 4. A fourth hopper is proposed to be installed for Kiln 5. From the hopper feeds, the stone is conveyed to the storage piles via radial stackers. The stone is then conveyed from the storage piles to screens and then conveyed to the appropriate kiln preheater.

Each kiln is equipped with a preheater. The stone passes through the preheater and into the kiln. Limestone entering the kilns is subjected to heat and a tumbling action. This process chemically alters the limestone to lime. The reaction requires a temperature in excess of 2,200°F. The calcining of limestone in the kilns occurs by one of the following reactions:

$$CaCO_3 + \text{heat} \rightarrow CO_2 + CaO \text{ (high calcium lime)}$$

$$CaCO_3{\cdot}MgCO_3 + \text{heat} \rightarrow 2CO_2 + CaO{\cdot}MgO \text{ (dolomitic lime)}$$

The lime is cooled, screened, and crushed as needed to create the required product. The lime is stored in storage silos and then transferred from the storage silos to either trucks or railcars for transport to customers. These trucks travel along the Sales Road.

Kiln heat is supplied by burning pulverized coal. Coal is delivered by truck. The coal trucks travel along the Sales Road and unload the coal into one of two below-grade hoppers. The coal is conveyed from the hoppers to the coal silos. The coal is then conveyed from the bottom of the silos to the coal mills and then blown into the kilns. Each kiln has its own coal silo and coal mill. The coal feed rate to the kilns varies depending on kiln size and the size of the limestone being fed to the kilns. During a kiln startup, propane and/or diesel fuel is used as a startup fuel.

2.0 SOURCES OF ROADWAY FUGITIVE DUST

Activities that produce fugitive dust along the roads at the Cricket Mountain Plant include hauling crushed limestone to the plant on the Main Haul Road, hauling lime products from the plant on the Sales Road, and delivering coal to the plant. The sections of the Main Haul Road and the Sales Road are described in more detail in the following sections. Figure 1 displays the approximate locations of the various road sections.

2.1 SALES ROAD

Type of Activities: Lime trucks hauling lime products from the plant and coal trucks delivering coal to the plant.

Description: The Sales Road has been repeatedly treated with dust suppressant for a number of years. The surface is hard and relatively flat. The road is fairly straight and traffic travels at a relatively uniform speed. All vehicles traveling on the Sales Road will adhere to the posted speed limit.

2.2 MAIN HAUL ROAD – FLAT IRON QUARRY TO INTERSECTION WITH DOLOMITE QUARRY

Type of Activities: Trucks hauling crushed limestone. Trucks consist of a tractor followed by one or more trailers. Rock haul trucks hauling broken limestone from the Dolomite Quarry to the crusher in the Flat Iron Quarry.

Description: This section of the Main Haul Road has been repeatedly treated with dust suppressant for a number of years. The surface is hard and relatively flat. Trucks do not travel a uniform speed over this section of the road since their speed varies as they approach and leave the Flat Iron and Dolomite quarries. Due to the changing speeds and exit from the quarries, this section of the road typically has more material (silt, sand, gravel, etc.) on it than the middle section of the Main Haul Road.

2.3 MAIN HAUL ROAD – 4.1-MILE SECTION EAST OF DOLOMITE QUARRY INTERSECTION

Type of Activities: Trucks hauling crushed limestone. Trucks consist of a tractor followed by one or more trailers.

Description: This section of the Main Haul Road has been repeatedly treated with dust suppressant for a number of years. The surface is hard and relatively flat. Trucks travel a uniform speed over this section of the road. The road is fairly straight in this section. This section of the road typically has little material (silt, sand, gravel, etc.) on it. The maximum speed allowed on this section of road is 50 miles per hour.

2.4 MAIN HAUL ROAD – ½-MILE SECTION WEST OF PLANT

Type of Activities: Trucks hauling crushed limestone. Trucks consist of a tractor followed by one or more trailers.

Description: This section of the Main Haul Road has been repeatedly treated with dust suppressant for a number of years. The surface is hard and relatively flat. Trucks do not travel a uniform speed over this section of the road since their speed varies as they approach and leave the plant area. Due to the changing speeds, this section of the road typically has more material (silt, sand, gravel, etc.) on it than the middle section of the Main Haul Road.

INSERT FIGURE 1

3.0 MONITORING

3.1 VISUAL DUST OBSERVATIONS

Visual dust observations shall be used to determine the dust control measures needed for the various sections of the roads identified in Section 2.0. Other indicators, such as weather conditions and level of truck traffic, may also be used to determine the most effective dust control measures.

Visual dust observations will be performed on an informal basis throughout the day by the water truck driver, haul truck drivers, Quarry Supervisor, and other plant personnel. At least once each day during normal business hours, the Quarry Supervisor or designated alternate will log the level of dust control implemented on the 'Road Dust Control Log'. The dust control levels are described in Section 4.0. The instructions for the log and a blank log are contained in Appendix A.

The observation can be made through the vehicle side-view mirror or from an observer not in the vehicle. Dust control measures that are to be implemented are outlined in Section 4.0.

3.2 ROAD DUST OPACITY MONITORING

Road dust opacity monitoring will be conducted to determine the overall effectiveness of the dust control measures and compliance with the applicable fugitive dust requirements in UAR R307-205.

Monitoring will be conducted on a weekly basis. The monitoring will be conducted at a different location each week. One of the weekly monitoring events each month will occur on the Sales Road.

The road dust opacity monitoring will be conducted in accordance with the following method that has been approved by USEPA. The form in Appendix B will be used to document the opacity monitoring. Additional information on the test method is available at:

http://epa.gov/region9/air/phoenixpm/fip/method.html.

Step 1: Stand at least 16.5 feet from the source (travel lane) in order to provide a clear view of the emissions with the sun oriented in the 140-degree sector to the back. Following these requirements, make opacity observations so that the line of vision is approximately perpendicular to the dust plume and wind direction. If multiple plumes are involved, do not include more than one plume in the line of sight at one time.

Step 2: Record the fugitive dust source location, source type, method of control used, observer's name, certification data, and a sketch of the observer's position relative to the fugitive dust source. Also record the time, estimated distance to the fugitive dust source location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), observer's position to the fugitive dust source, and color of the plume and type of background on the visible emission observation form both when opacity readings are initiated and completed.

Step 3: Make opacity observations, to the extent possible, using a contrasting background that is perpendicular to the line of vision. Make opacity observations approximately 1 meter above the surface from which the plume is generated. Note that the observation is to be made at only one visual point upon generation of a plume, as opposed to visually tracking the entire length of a dust plume as it is created along a surface (along the road). Make two observations per vehicle, beginning the first reading at zero seconds and the second reading at five seconds. The zero-second observation should begin immediately after a plume has been created above the surface involved. Do not look continuously at the plume but, instead, observe the plume briefly at zero seconds and then again at five seconds.

Step 4: Record the opacity observations to the nearest 5% on an observational record sheet. Each momentary observation recorded represents the average opacity of emissions for a 5-second period. While it is not required by the test method, EPA recommends that the observer estimate the size of vehicles which generate dust plumes for which readings are taken (e.g. mid-size passenger car or heavy-duty truck) and the approximate speeds the vehicles are traveling when readings are taken.

Step 5: Repeat Step 3 and Step 4 until you have recorded a total of 12 consecutive opacity readings. This will occur once six vehicles have driven on the source in your line of observation for which you are able to take proper readings. The 12 consecutive readings must be taken within the same period of observation but must not exceed 1 hour. Observations immediately preceding and following interrupted observations can be considered consecutive.

Step 6: Average the 12 consecutive readings together.

The road dust opacity monitoring will be conducted by an USEPA Method 9 certified observer. Results from the opacity monitoring will be recorded and maintained onsite.

4.0 ROAD DUST CONTROL ACTIVITIES

4.1 DUST CONTROL LEVELS

Multiple levels of fugitive dust control measures will be implemented as needed for the Sales Road and the different sections of the Main Haul Road. The first level, Level 0, describes when no dust control measures are required. Higher levels describe dust control measures that are progressively more stringent.

Monitoring indicators that advance the dust control measures to the different levels will be based on visual dust observations, weekly road dust opacity monitoring, weather conditions, and level of truck traffic. The water truck driver(s) will use the monitoring indicators and observations made by others to determine the proper dust control level and the dust control measures for the current conditions. The Quarry Supervisor shares the responsibility to verify that proper dust control measures are being implemented.

Level 1 is the baseline level. Roads will be watered at least once daily unless weather conditions make watering unnecessary (rain, damp conditions, etc.) or make driving conditions dangerous (freezing temperatures, snow, etc.). If weather conditions make watering unnecessary, the dust control level will decrease to Level 0. If freezing temperatures exist, the dust control level will either be Level 0 or Level 3 based on the results of the visual observations.

The following control levels shall be used in conjunction with the monitoring indicators:

Level 0: No dust control measures are required due to rain, snow, little to no truck traffic, freezing temperatures, or other conditions where no fugitive dust is generated.

Level 1: This level is the normal or typical dust control measure until other levels are triggered by a monitor indicator. The water truck shall be used at this level of dust control. The Sales Road and all sections of the Main Haul Road will be watered at least once daily. Typically, a single application of water re-activates the dust suppressant and the silt and larger particles adhere to the road surface.

Level 2: This level of control consists of increased watering frequency for those locations where the monitor indicators show a high potential for fugitive dust generation. This level will most likely be needed during high wind events or on hot, dry days.

Level 3: This level of control consists of the use of a street sweeper or vacuum truck to remove material (silt, sand, gravel, etc.) on the road surface in those locations where lower levels of dust control measures have not been effective. This level of dust control may also be required when freezing temperatures prohibit the use of the water truck due to the creation of unsafe driving conditions.

Based on past experience, dust suppressant treatments plus the proper implementation of the three levels of control outlined above should be sufficient to minimize dust generation. Generally, the entire road is in good shape, but problems may arise in small sections due to dust blown from the desert and landing on the road, road is slightly inclined so the surface in this area degrades at a slight faster rate than other sections, formation of pot holes, etc. If the implementation of Level 3 controls does not control the dust in the problem section(s), one or more of the following actions will be taken:

- Apply another coat of dust suppressant to the problem section(s) of the road
- Reduce the speed of the haul trucks while passing through the problem section(s) of the road
- Perform road maintenance as needed in the problem section(s), such as repairing a pot hole or grading the surface

4.2 ROUTINE DUST CONTROL ACTIVITIES

The following dust control activities will be performed on routine basis:

- The Main Haul Road and the Sales Road will be treated with dust suppressant three times per year.
- Roads will be watered at least once per day and on an as-needed basis unless weather conditions make watering unnecessary (rain, damp conditions, etc.) or create dangerous driving conditions (freezing temperatures, snow, etc.).
- The ½-mile section of the Main Haul Road that is closest to the plant will be swept at least once per month and on an as-needed basis.
- All vehicles traveling on the Sales Road and Main Haul Road will adhere to the posted speed limits.

5.0 RECORDKEEPING

Records will be maintained to demonstrate that the Fugitive Dust Control Plan is implemented. These records will be located in the environmental files in Main Office Building at the Cricket Mountain Plant. Completed Road Dust Control Logs and Road Opacity Monitoring Sheets will be maintained. Blank copies of the Road Dust Control Log and Road Opacity Monitoring Form are located in Appendix A and B, respectively.

Records will be maintained on site for at least 5 years in accordance with the Cricket Mountain Plant's current Title V Operating Permit requirements and will be made available to inspectors at their request.

6.0 QUALITY ASSURANCE

Annually, unless otherwise needed, this plan and the Road Dust Control Logs will be reviewed by the Cricket Mountain Plant Manager and a Graymont Environmental Engineer. If they determine that revisions to this plan are necessary, the plan will be revised and submitted to the UDAQ. The review log will be maintained in Appendix C.

APPENDIX A

Road Dust Control Log and Instructions

Road Dust Control Log Instructions

Graymont Western US Inc. - Cricket Mountain Plant

PURPOSE: Visual dust observations shall be used to determine the dust control measures needed for the Sales Road and the sections of the Main Haul Road. This log provides a record of the dust control measures implemented.

INSTRUCTIONS:

1) Once each normal business day, the Quarry Supervisor or designated alternate must record the level of dust control implemented on that day for each section of road on the Road Dust Control Log.

2) If a level 1, 2, or 3 was recorded, the actions taken must be indicated by placing an X in the corresponding box or describing the actions taken if they are not listed.

DUST CONTROL LEVELS:

Level 0: No dust control measures needed due to rain, snow, little or no truck traffic, freezing temperatures, or other conditions where no fugitive dust is occurring.

Level 1: Water truck used once per day.

Level 2: Increased watering frequency is required (i.e., more than once per day).

Level 3: Street sweeper or vacuum truck used.

ROAD SECTIONS:

Sales Road: Road between plant and highway 257

FIQ-DOQ: Main haul road between Flat Iron Quarry and Dolomite Quarry (west end)

DOQ-P (W): 4.1-mile section from the Dolomite Quarry towards the Plant on the Main Haul Road (middle section)

DOQ-P (E): ½-mile section of the Main Haul Road that is closest to the plant (east end)

RECORDKEEPING:

Store completed Road Dust Control Logs in the environmental files in the Main Office Building.

Road Dust Control Log

Graymont Western US Inc.
Cricket Mountain Plant

GRAYMONT

DATE	INITIALS	ROAD SECTION	DUST CONTROL LEVEL	ACTIONS TAKEN: WATER ONCE PER DAY	HIGHER WATERING FREQUENCY	USED STREET SWEEPER	OTHER ACTION TAKEN – DESCRIBE ACTION(S)
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					
		Sales Road					
		FIQ-DOQ					
		DOQ-P (W)					
		DOQ-P (E)					

APPENDIX B

Road Opacity Monitoring Form and Instructions

Road Opacity Monitoring Instructions

Graymont Western US Inc. - Cricket Mountain Plant

PURPOSE: Road dust opacity monitoring will be conducted to determine the overall effectiveness of the dust control measures.

INSTRUCTIONS:

1) Conduct opacity monitoring one time per week. One of the weekly monitoring events each month must occur on the Sales Road. All other monitoring events will take place along the Main Haul Road.

2) The weekly monitoring events must be conducted at a different location each week. This will ensure that the dust control measures implemented at the different road sections are effective.

3) Conduct the opacity monitoring in accordance with the following method and record the information on the Road Opacity Monitoring Form.

OPACITY MONITORING PROCEDURE:

1) Stand at least 16.5 feet from the source (travel lane) in order to provide a clear view of the emissions with the sun oriented in the 140-degree sector to the back.

2) Make opacity observations so that the line of vision is approximately perpendicular to the dust plume and wind direction. If multiple plumes are involved, do not include more than one plume in the line of sight at one time.

3) Record the following information on the Road Opacity Monitoring Form:

   a. Fugitive dust source location
   b. Method of control used
   c. Observer's name and certification data
   d. A sketch of the observer's position relative to the fugitive dust source
   e. Time, approximate wind direction, estimated wind speed
   f. Description of the sky condition (presence and color of clouds)
   g. Estimated distance to the fugitive dust source location
   h. Color of the plume and type of background on the visible emission observation form both when opacity readings are initiated and completed.

4) Make opacity observations, to the extent possible, using a contrasting background that is perpendicular to the line of vision.

5) Make opacity observations approximately 1 meter above the surface from which the plume is generated. Note that the observation is to be made at only one visual point upon generation of a plume, as opposed to visually tracking the entire length of a dust plume as it is created along a surface (along the road).

6) Make two observations per vehicle, beginning the first reading at zero seconds and the second reading at five seconds. The zero-second observation should begin immediately after a plume has been created above the surface involved. Do not look continuously at the plume but, instead, observe the plume briefly at zero seconds and then again at five seconds.

7) Record the opacity observations to the nearest 5% on Road Opacity Monitoring Form. Each momentary observation recorded represents the average opacity of emissions for a 5-second period.

8) Record the type of vehicles which generate the dust plumes for which readings are taken (e.g. mid-size passenger car or heavy-duty truck) and the approximate speeds the vehicles are traveling when readings are taken.

9) Repeat Steps 4 through 8 until you have recorded a total of 12 consecutive opacity readings. This will occur once six vehicles have driven on the source in your line of observation for which you are able to take proper readings. The 12 consecutive readings must be taken within the same period of observation but must not exceed 1 hour. Observations immediately preceding and following interrupted observations can be considered consecutive.

10) Average the 12 consecutive readings together.

GRAYMONT

Road Opacity Monitoring Sheet

Graymont Western US Inc.
Cricket Mountain Plant

OBSERVER:	OBSERVATION DATE:
OBSERVER'S SIGNATURE:	OBSERVATION START TIME:
OBSERVER'S CERTIFICATION DATE:	OBSERVATION END TIME:

SECTION OF ROAD OBSERVING: ☐ SALES ROAD MAIN HAUL ROAD: ☐ ½-MILE EAST END ☐ MIDDLE 4.1-MILE SECTION ☐ FIQ TO DOQ INTERSECTION (WEST END)

FOR MAIN HAUL ROAD INDICATE DISTANCE FROM EASTERN CATTLE GUARD CROSSING:________ MILES

METHOD OF CONTROL LAST APPLIED: ☐ DUST SUPPRESSANT ☐ WATER ☐ STREET CLEANING ☐ OTHER:________________

WEATHER CONDITIONS

ESTIMATED WIND SPEED: ____________ MILES PER HOUR

APPROXIMATE DIRECTION WIND IS BLOWING FROM:

NW	N	NE
W		E
SW	S	SE

SKY CONDITIONS (CIRCLE ONE):

CLEAR OVERCAST CLOUDY: 20% 40% 60% 80%

VISIBLE EMISSION OBSERVATION

COLOR OF THE PLUME: BEGINNING: ____________________

ENDING: ____________________

PLUME BACKGROUND (CIRCLE ONE):

BEGINNING:	CLEAR SKY	CLOUDS	VEGETATION
ENDING:	CLEAR SKY	CLOUDS	VEGETATION

BACKGROUND COLOR: ____________________

DISTANCE FROM DUST SOURCE TO OBSERVER: __________ FEET

OPACITY OBSERVATIONS

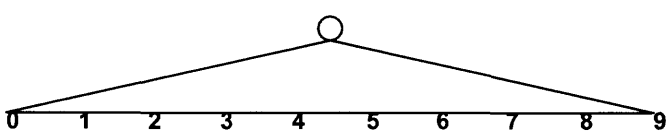
	FIRST READING* (AT ZERO SECONDS)	SECOND READING* (AT FIVE SECONDS)	VEHICLE TYPE (SEMI-TRUCK, PICKUP TRUCK, ETC.)	APPROXIMATE VEHICLE SPEED (MPH)
VEHICLE 1				
VEHICLE 2				
VEHICLE 3				
VEHICLE 4				
VEHICLE 5				
VEHICLE 6				
AVERAGE OF THE 12 READINGS:				

* EACH READING REPRESENTS THE AVERAGE OPACITY OF THE EMISSIONS FOR A 5-SECOND PERIOD

* RECORD OPACITY OBSERVATIONS TO THE NEAREST 5%

OBSERVER'S POSITION

SKETCH OBSERVER'S POSITION RELATIVE TO THE DUST SOURCE AND SUN POSITION.



(CIRCLE SUN POSITION)

OBSERVER'S COMMENTS

____

____

____

____

____

____

APPENDIX C

Fugitive Dust Control Plan Annual Review Log

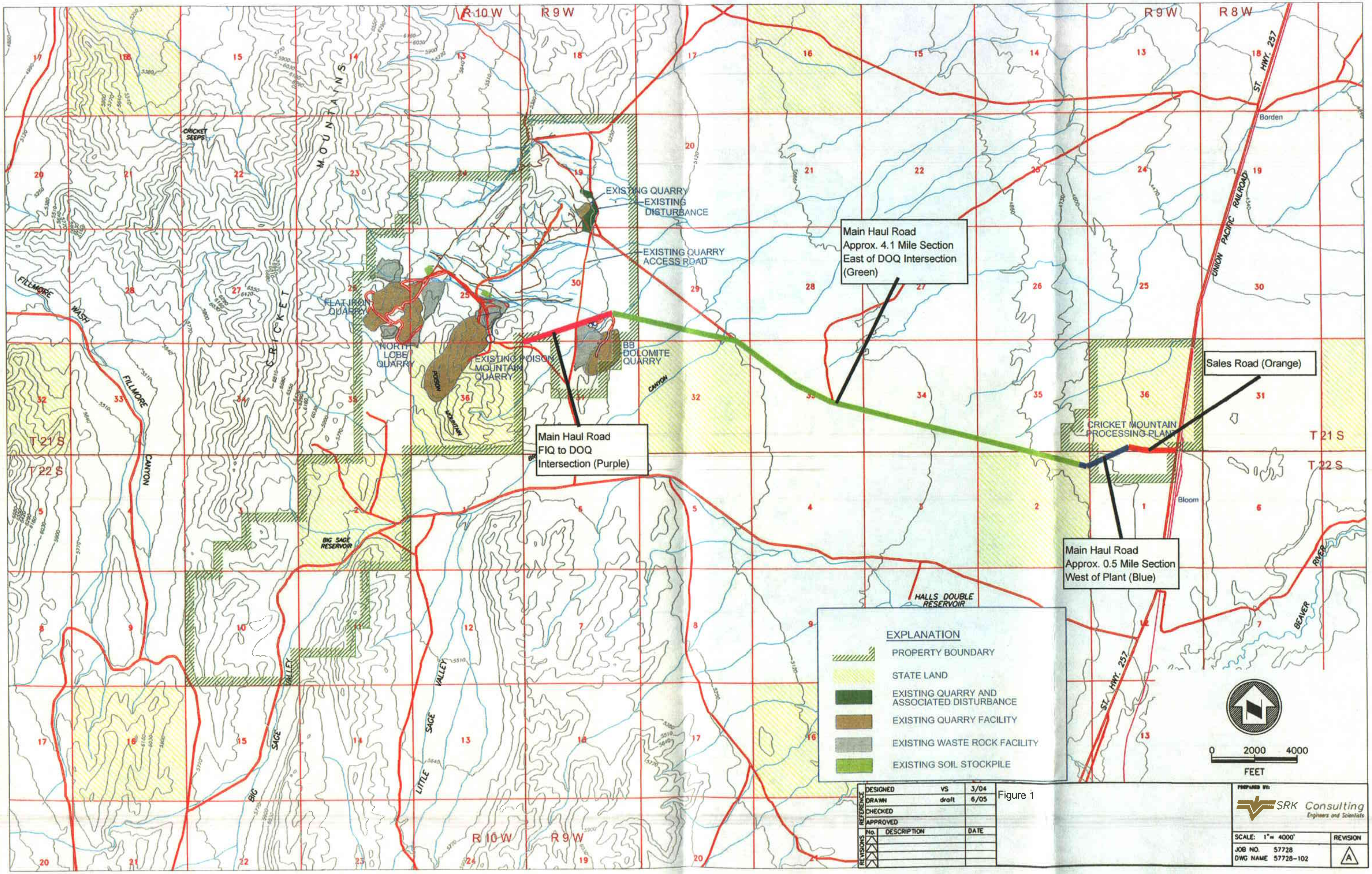
GRAYMONT

Fugitive Dust Control Plan Annual Review Log

Graymont Western US Inc.

Cricket Mountain Plant

DATE	PLAN REVIEWED BY	PLAN REVISION(S) NEEDED? (Yes/No)	IF PLAN REVISED, DATE REVISED PLAN WAS SUBMITTED TO UDAQ



R 10 W
R 9 W
R 8 W
T 21 S
T 22 S
CRICKET MOUNTAINS
CRICKET SEEPS
FILLMORE WASH
FILLMORE CANYON
BIG SAGE VALLEY
LITTLE SAGE VALLEY
BIG SAGE RESERVOIR
HALLS DOUBLE RESERVOIR
BEAVER RIVER
UNION PACIFIC RAILROAD
ST. HWY. 257
Borden
Bloom
FLAT IRON QUARRY
NORTH LOBE QUARRY
EXISTING POISON MOUNTAIN QUARRY
POISON MOUNTAIN
BB DOLOMITE QUARRY
CANYON
EXISTING QUARRY
EXISTING DISTURBANCE
EXISTING QUARRY ACCESS ROAD
CRICKET MOUNTAIN PROCESSING PLANT
Main Haul Road
FIQ to DOQ
Intersection (Purple)
Main Haul Road
Approx. 4.1 Mile Section
East of DOQ Intersection
(Green)
Main Haul Road
Approx. 0.5 Mile Section
West of Plant (Blue)
Sales Road (Orange)
EXPLANATION
PROPERTY BOUNDARY
STATE LAND
EXISTING QUARRY AND ASSOCIATED DISTURBANCE
EXISTING QUARRY FACILITY
EXISTING WASTE ROCK FACILITY
EXISTING SOIL STOCKPILE
0 2000 4000
FEET
DESIGNED VS 3/04
DRAWN draft 6/05
CHECKED
APPROVED
REFERENCE
REVISIONS
No. DESCRIPTION DATE
Figure 1
PREPARED BY:
SRK Consulting
Engineers and Scientists
SCALE: 1"= 4000'
JOB NO. 57728
DWG NAME 57728-102
REVISION
A

State of Utah

Department of Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF AIR QUALITY
Cherly Heying
Director

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

DAQE-AN0103130026-08

January 24, 2008

Scott Mork
Graymont Western US Inc.
Cricket Mountain Plant
P.O. Box 669
Delta, Utah 84624

Dear Mr. Mork:

Re: Approval Order: Administrative Amendment to Approval Order DAQE-AN0103130022-07 for Kiln Drive Fuel Type Designation; Millard County – CDS A; ATT; NSPS; NESHAPS; Title V Major
Project Code: N010313-0026

The Attached document is the Approval Order for the above-referenced project.

Future correspondence on this Approval Order should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. Please direct any technical questions you may have on this project to Mr. Jon Black. He may be reached at (801) 536-4047.

Sincerely,

M. Cheryl Heying, Executive Secretary
Utah Air Quality Board

cc: Central Utah Public Health Department

Mike Owens, EPA Region VIII

MCH:JB:kw

STATE OF UTAH

Department of Environmental Quality

Division of Air Quality

APPROVAL ORDER: Administrative Amendment to Approval Order DAQE-AN0103130022-07 for Kiln Drive Fuel Type Designation

Prepared By: Jon Black, Engineer
(801) 536-4047
Email: jlblack@utah.gov

APPROVAL ORDER NUMBER

DAQE-AN0103130026-08

Date: January 24, 2008

Graymont Western US Inc.

Source Contact
Scott Mork
(435) 864-3823

M. Cheryl Heying
Executive Secretary
Utah Air Quality Board

Abstract

Graymont Western US Inc. submitted a request for an Administrative Amendment to Approval Order (AO) DAQE-AN0103130022-07 for correct designation of fuel type for the kiln drive engines currently listed in Condition #9.T of the above stated AO.

Under both the New Source Review (NSR) and Title V programs, the Cricket Mountain Plant is a major stationary source of air emissions. This project will not result in an emissions increase. The Cricket Mountain Plant is located southwest of the city of Delta in Millard County, Utah. Millard County is an attainment area of the National Ambient Air Quality Standards (NAAQS) for all pollutants. The plant is located within 250 kilometers of several areas that are classified as Class I areas under the Prevention of Significant Deterioration (PSD) program for the protection of air quality.

New Source Performance Standards (NSPS) 40 CFR 60 Subparts A (General Provisions), Subpart Y (Standards of Performance for Coal Preparation Plants), Subpart HH (Standards of Performance for Lime Manufacturing Plants) and Subpart OOO (Standards of Performance for Nonmetallic Mineral Processing Plants) regulations apply to this source. National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart AAAAA (Lime Manufacturing Plants) regulations apply to this source. Maximum Achievable Control Technology (MACT) regulations do not apply to this source. Title V of the 1990 Clean Air Act applies to this source. There will not be an emissions increase associated with this Administrative Amendment for fuel type correction as the kiln drive engines were addressed in a previous AO document.

The emissions, in tons per year, will remain as follows: $PM_{10} = 610.86$, $NO_x = 3884.17$, $SO_2 = 761.24$, $CO = 7817.80$, $VOC = 116.35$, $HAPs = 39.45$.

The project has been evaluated and found to be consistent with the requirements of the Utah Administrative Code Rule 307 (UAC R307). A public comment period was held in accordance with UAC R307-401-7 and comments were received. All Comments were evaluated and addressed. This air quality Approval Order (AO) authorizes the project with the following conditions, and failure to comply with any of the conditions may constitute a violation of this approval order.

General Conditions:

1. This AO applies to the following company:

Site Office		Corporate Office Location
Graymont Western US Inc. Cricket Mountain Plant P.O. Box 669 Delta, Utah 84624		Graymont Western US Inc. 3950 South 700 East Suite 301 Salt Lake City, Utah 84107
Phone Number	(435) 864-3823	(801) 264-6876
Fax Number	(435) 864-3431	(801) 264-6874

The equipment listed in this AO shall be operated at the following location:

32 miles Southwest of Delta, Utah, Highway 257, Millard County

Universal Transverse Mercator (UTM) Coordinate System: UTM Datum NAD27
4,311.01 kilometers Northing, 343.10 kilometers Easting, Zone 12

2. All definitions, terms, abbreviations, and references used in this AO conform to those used in the Utah Administrative Code (UAC) Rule 307 (R307) and Title 40 of the Code of Federal Regulations (40 CFR). Unless noted otherwise, references cited in these AO conditions refer to those rules.

3. The limits set forth in this AO shall not be exceeded without prior approval in accordance with R307-401.

4. Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved in accordance with R307-401.

5. All records referenced in this AO or in applicable NSPS and/or NESHAP and/or MACT standards, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request. Records shall be kept for the following minimum periods:

A.	Used oil consumption	Five years
B.	Emission inventories	Five years from the due date of each emission statement or until the next inventory is due, whichever is longer.
C.	Fugitive dust control	Five years
D.	All other records	Five years

6. Graymont Western US Inc. (Graymont), shall operate the Cricket Mountain Plant with all associated equipment and shall conduct its operations of the Cricket Mountain plant in accordance with the terms and conditions of this AO, which was written pursuant to Graymont's Notice of Intent submitted to the Division of Air Quality (DAQ) on October 29, 2007.

7. Within 60 days after Kiln #5 achieves the maximum production rate at which the kiln will be operated at, but no later than 180 days after the initial startup of Kiln #5; Graymont shall only operate Kiln #1 with a baghouse for particulate emission control.

8. This AO shall replace the AO (DAQE-AN0103130022-07) dated August 14, 2007.

9. The approved installations shall consist of the following equipment at the plant and quarry:

A. Lime Kiln #1, rated at 600 tons of lime per 24-hour period with a preheater and baghouse emissions control system rated at:

1) A/C ratio – To be determined[1]

2) Exhaust gas flow rate - 54,000 scfm

The wet scrubber[2] emissions control system (Ducon UW-4, Size 138 or equivalent) rated at:

3) Exhaust gas flow rate - 32,000 scfm

B. Lime Kiln #2, rated at 600 tons of lime per 24-hour period with a preheater, cyclone and baghouse with the following parameters:

1) Air to cloth (A/C) ratio - 4.4:1

2) Exhaust gas flow rate - 48,000 scfm

C. Lime Kiln #3, rated at 840 tons of lime per 24-hour period with preheater, cyclone and baghouse with the following parameters:

1) A/C ratio - 4.6:1

2) Exhaust gas flow rate - 55,000 scfm

D. Lime Kiln #4, rated at 1266 tons of lime per 24-hour period with preheater, cyclone and baghouse with the following parameters:

1) A/C ratio -5:1

2) Exhaust gas flow rate - 100,000 scfm

E. Lime Kiln #5, rated at 1400 tons of lime per 24-hour period with preheater and baghouse with the following parameters:

1) A/C ratio – To be determined

2) Exhaust gas flow rate – 103,000 scfm

---

1 - All air to cloth ratios shall be verified at the time of stack testing.
2 - Note: The wet scrubber will be in operation during the installation of Kiln #5 and will operate in accordance with Condition #7 of this AO.

F. Coal Handling

1) 4 - Vibratory Feeders

2) Misc. Conveyors

G. Coal Silo Baghouses

1) D-91 & D-391 for kiln #1 and #3 respectively[3]

a. Exhaust gas flow rate - 1000 scfm

2) D-94 for kiln #2

a. Exhaust gas flow rate - 1000 scfm

3) D-491 for kiln #4

a. Exhaust gas flow rate – 1500 scfm

4) D-591 for kiln #5

a. Exhaust gas flow rate - 1000 acfm

H. Product Baghouses

1) D-330 for Kiln #3

a. Exhaust gas flow rate - 11,000 scfm

2) D-331 for Kiln #1, #2 and loadout

a. Exhaust gas flow rate - 32,000 scfm

3) D-447 for Kiln #4

a. Exhaust gas flow rate - 18,300 scfm

4) D-463 for Kiln #4, C472, C474, C464

a. Exhaust gas flow rate - 8,300 scfm

5) D-341 for Silo T-341

a. Exhaust gas flow rate - 2,000 scfm

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3 - All Equipment ID numbers are those used by Graymont Western U.S. Inc.

6) D-530 (product handling baghouse #1 for new screen house)

a. Exhaust gas flow rate – 9,000 acfm

7) D-564 (product handling baghouse #2 for new screen house)

a. Exhaust gas flow rate – 9,000 acfm

8) D-547 (product handling baghouse #3 for new screen house)

a. Exhaust gas flow rate – 9,000 acfm

I. Lime Kiln Dust Silos with baghouses

1) D-83 (for Kilns #1, #2 and #3)(Baghouse D-489)

a. Exhaust gas flow rate – 5,000 scfm

2) D-486 (for Kiln #4)

a. Exhaust gas flow rate – 4,000 scfm

3) D-466 (for an additional silo)

a. Exhaust gas flow rate – 4,000 scfm

4) D-586 (for Kiln #5 dust silo)

a. Exhaust gas flow rate – 2,500 acfm

5) D-589 (for loadout of Kiln #5 dust silo)

a. Exhaust gas flow rate – 1,500 acfm

J. Product Loadout Baghouse

1) D-333 (rail load out)

a. Exhaust gas flow rate – 10,000 scfm

K. Limestone ore preparation (crushing and screening at both the quarry and the plant) with water spray or baghouses for dust control. In addition, the following:

1) D-10 (stone dressing screen for Kiln #1 & #2) baghouse

a. Exhaust gas flow rate - 8,000 scfm

2) D-310 (stone dressing screen for Kiln #3) baghouse

a. Exhaust gas flow rate - 8,000 scfm

3) D-414 (stone dressing screen for Kiln #4) baghouse

a. Exhaust gas flow rate - 3,100 scfm

4) D-514 (stone dressing screen for Kiln #5) baghouse

a. Exhaust gas flow rate – 4,500 acfm

5) D-1 (Quarry Crusher & Screen) baghouse

a. Exhaust gas flow rate - 28,000 scfm

6) R-041 (Secondary Crusher)

a. Cone Crusher

b. Rated: 300 tons/hour

7) S-041 (Secondary Screen)

a. Rated: 600 ton/hour

b. 8' x 20'

L. Conveying systems

1) D-415 (Limestone dump to Kiln #4 preheater) baghouse

a. Exhaust gas flow rate - 600 scfm

2) D-403 (stone dump from conveyor 408 & 409 to reclaim pile) baghouse

a. Exhaust gas flow rate - 2,200 scfm

3) D-503 (dust collection for Kiln #5 limestone conveyor transfer points) baghouse

a. Exhaust flow rate – 2,000 acfm

4) C-045 (Fines Truck Loadout Conveyor)

a. Rated: 250 tons/hour

5) C-305 (Medium and Small Stone Pile Conveyor)

a. Rated: 600 tons/hour

M. Haul road (quarry to plant - six miles - and plant to highway) with dust suppression and water.

N. Haul road (in quarry) with water spray for fugitive emissions and dust control.

O. Dolomitic Lime handling System

1) N470 (Recycle Bin)

2) D479 Baghouse (Product transfer to S471, T470, T471, T472, T473, and T474. The 435 material handling system, which consists of 2 elevators, a vibratory conveyor, a number of belt conveyors, a mixing screw conveyor and a briquetter)

a. Exhaust gas flow rate – 6,220 scfm

P. Limestone Grinding Plant

1) D7122 Baghouse (Grinding Mill, Direct fire heater, Material separator)

a. Exhaust gas flow rate - 10,000 scfm

2) D7133 Baghouse (Screen, 3 Bucket Elevators, 3 Storage Silos inlet)

a. Exhaust gas flow rate - 4,500 scfm

3) D7141 Baghouse (Truck load-out, Rail load-out)

a. Exhaust gas flow rate - 3,500 scfm

4) D7142 Baghouse (Rail load-out)

a. Exhaust gas flow rate – 4,000 scfm

5) Misc. Conveyors

Q. Sugar Stone System

1) Misc. Conveyors, Screens, and Hopper

2) Rail load-out

3) 100 hp diesel generator

R. Portable Crusher System

1) Feed Hopper

2) Primary Crusher

3) Secondary Crusher

4) Screen

5) Conveyors

6) 3 - Diesel engines - 740 hp total
Crusher System is rated at 690 tons/hour

S. Pressure Washer

T. Kiln Drive Engines

	Kiln	Rating	Fuel Type
1)	Kiln #1	52 HP	Gasoline or Diesel
2)	Kiln #2	45 HP	Gasoline or Diesel
3)	Kiln #3	55 HP	Gasoline or Diesel
4)	Kiln #4	65 HP	Gasoline or Diesel
5)	Kiln #5	156 HP	Gasoline or Diesel

Note: Rated capacities, flow rates and kiln drive engines listed in Condition 9 are for informational purposes and do not represent an AO limitation.

10. Graymont shall notify the Executive Secretary in writing when the installation of the equipment listed in Conditions #9.E, #9.G(4), #9.H(6)(7)(8), #9.I(4)(5), #9.K(4), #9.L(3), and #9.T has been completed and is operational, as an initial compliance inspection is required. To insure proper credit when notifying the Executive Secretary, send your correspondence to the Executive Secretary, attn: Compliance Section.

If the construction and/or installation has not been completed within eighteen months from the date of this AO, the Executive Secretary shall be notified in writing on the status of the construction and/or installation. At that time, the Executive Secretary shall require documentation of the continuous construction and/or installation of the operation and may revoke the AO in accordance with R307-401-18.

Limitations and Tests Procedures

11. Emissions to the atmosphere at all times from the indicated emission points shall not exceed the following rates and concentrations:

Source: Kiln #1 (Baghouse Operation)

Pollutant	lb/hr	lb/tsf[4]	grains/dscf (68°F, 29.92 in Hg)
TSP		0.12	0.020
PM_{10}	6.0		0.016
SO_2[5]	22.4		
NOx	90.0		

Source: Kiln #1 (Scrubber Operation)[6]

Pollutant	lb/hr	lb/tsf	grains/dscf (68°F, 29.92 in Hg)
TSP	19.75	0.60	0.072
PM_{10}	15.9		0.058
SO_2[7]	22.4		

Source: Kiln #2

Pollutant	lb/hr	lb/tsf	grains/dscf (68°F, 29.92 in Hg)
TSP	8.23	0.12	0.020
PM_{10}	6.58		0.016
SO_2[8]	22.4		
NO_x	120.0		

Source: Kiln #3

Pollutant	lb/hr	lb/tsf	grains/dscf (68°F, 29.92 in Hg)
TSP	9.43	0.12	0.020
PM_{10}	7.54		0.016

4 - lb/tsf is defined as (pounds per ton of stone fed) as required by 40 CFR 63 Subpart AAAAA.
5, 7, 8 - After the installation of an SO_2 CEMS, compliance with the SO_2 emission limit will be based on a 3-hour block average.
6 - Note: The wet scrubber will be in operation during the installation of Kiln #5 and will operate in accordance with Condition #7 of this AO.

SO_2[9] 27.2
NO_x................160.0

Source: Kiln #4

Pollutant	lb/hr	lb/tsf	grains/dscf (68°F, 29.92 in Hg)
TSP	17.14	0.12	0.020
PM_{10}	13.7		0.016
SO_2[10]	38.4		
NO_x	200.0		

Source: Kiln #5

Pollutant	lb/hr	lb/tsf	grains/dscf (68°F, 29.92 in Hg)
TSP		0.10	0.020
PM_{10}	11.7		0.016
SO_2[11]	59.0		
NO_x	210.0		
CO	233.0		

12. Stack testing to show compliance with the emission limitations stated in the above condition shall be performed as specified below:

A.

Emissions Point	Pollutant	Testing Status	Test Frequency
Kiln #1 Stack (Baghouse)	TSP	**	+
	PM_{10}	**	+
	SO_2	**	+
	NO_x	**	+
Kiln #1 Stack (Scrubber)	TSP	***	+
	PM_{10}	*	+
	SO_2	*	+

B.

Emissions Point	Pollutant	Testing Status	Test Frequency
Kiln #2 Stack	TSP	***	+
	PM_{10}	***	+

9, 10, 11 - After the installation of an SO_2 CEMS, compliance with the SO_2 emission limit will be based on a 3-hour block average.

	SO_2	*	+
	NO_x	*	+

C.

Emissions Point	Pollutant	Testing Status	Test Frequency
Kiln #3 Stack	TSP	***	+
	PM_{10}	***	+
	SO_2	*	+
	NO_x	***	+

D.

Emissions Point	Pollutant	Testing Status	Test Frequency
Kiln #4 Stack	TSP	***	+
	PM_{10}	***	+
	SO_2	***	+
	NO_x	***	+

E.

Emissions Point	Pollutant	Testing Status	Test Frequency
Kiln #5 Stack	TSP	**	+
	PM_{10}	**	+
	SO_2	**	+
	NO_x	**	+
	CO	**	+

F. Testing Status

* No initial testing was required. However, testing is required every three years. The source shall be tested if directed by the Executive Secretary at any time.

** Initial compliance testing is required. The initial test date shall be performed as soon as possible and in no case later than 180 days after the start up of a new emission source, an existing source without an AO, or the granting of an AO to an existing emission source that has not had an initial compliance test performed. If an existing source is modified, a compliance test is required on the modified emission point that has an emission rate limit.

*** Initial compliance testing was required.

\+ Test every three years. The Executive Secretary may require testing at any time.

G. Notification

The Executive Secretary shall be notified at least 60 days prior to conducting any required emission testing for sources subject to 40 CFR 63 Subpart AAAAA. All other sources shall notify the Executive Secretary at least 30 days prior to conducting any required emission testing. A source test protocol shall be submitted to DAQ when the testing notification is submitted to the Executive Secretary.

The source test protocol shall be approved by the Executive Secretary prior to performing the test(s). The source test protocol shall outline the proposed test methodologies, stack to be tested, and procedures to be used. A pretest conference shall be held, if directed by the Executive Secretary.

H. Sample Location

The emission point shall be designed to conform to the requirements of 40 CFR 60, Appendix A, Method 1, or other methods as approved by the Executive Secretary. An Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) approved access shall be provided to the test location.

I. Volumetric Flow Rate

40 CFR 60, Appendix A, Method 2 or other testing methods approved by the Executive Secretary.

J. Total Suspended Particulate (TSP)

40 CFR 60, Appendix A, Method 5

K. PM_{10}

For stacks in which no liquid drops are present, the following methods shall be used: 40 CFR 51, Appendix M, Methods 201, 201a, or other testing methods approved by the Executive Secretary. The back half condensibles shall also be tested using the method specified by the Executive Secretary. All particulate captured shall be considered PM_{10}.

For stacks in which liquid drops are present, methods to eliminate the liquid drops should be explored. If no reasonable method to eliminate the drops exists, then the following methods shall be used: 40 CFR 60, Appendix A, Method 5, 5a, 5d, or 5e as appropriate, or other testing methods approved by the Executive Secretary. The back half condensibles shall also be tested using the method specified by the Executive Secretary. The portion of the front half of the catch considered PM_{10} shall be based on information in Appendix B of the fifth edition of the EPA document, AP-42, or other data acceptable to the Executive Secretary.

The back half condensibles shall not be used for compliance demonstration but shall be used for inventory purposes.

L. Sulfur Dioxide (SO_2)

40 CFR 60, Appendix A, Method 6, 6A, 6B, 6C, or other testing methods approved by the Executive Secretary.

M. Nitrogen Oxides (NO_x)

40 CFR 60, Appendix A, Method 7, 7A, 7B, 7C, 7D, 7E, or other testing methods approved by the Executive Secretary.

N. Carbon Monoxide (CO)

40 CFR 60, Appendix A, Method 10, or other testing methods approved by the Executive Secretary.

O. Calculations

To determine mass emission rates (lb/hr, etc.) the pollutant concentration as determined by the appropriate methods above shall be multiplied by the volumetric flow rate and any necessary conversion factors determined by the Executive Secretary, to give the results in the specified units of the emission limitation.

P. New Source Operation

For a new source/emission point, the production rate during all compliance testing shall be no less than 90% of the production rate listed in this AO. If the maximum AO allowable production rate has not been achieved at the time of the test, the following procedure shall be followed:

1) Testing shall be at no less than 90% of the production rate achieved to date.

2) If the test is passed, the new maximum allowable production rate shall be 110% of the tested achieved rate, but not more than the maximum allowable production rate. This new allowable maximum production rate shall remain in effect until successfully tested at a higher rate.

3) The owner/operator shall request a higher production rate when necessary. Testing at no less than 90% of the higher rate shall be conducted. A new maximum production rate (110% of the new rate) will then be allowed if the test is successful. This process may be repeated until the maximum AO production rate is achieved.

Q. Existing Source Operation

For the existing kilns, the production rate during all compliance testing shall be no less than 90% of the maximum production achieved in the previous three (3) years.

13. Visible emissions from the following emission points shall not exceed the following values:

A. Kilns #1, #2, #3, #4, and #5 .... 15% opacity

B. All ancillary silo and storage bin baghouses .... 10% opacity

C. Product baghouses .... 10 % opacity

D. All crushers .... 15% opacity

E. All screens .... 10% opacity

F. All conveyor transfer points .... 10% opacity

G. All diesel engines .... 20% opacity

H. Conveyor drop points .... 20% opacity

I. Subpart OOO baghouses .... 7% opacity

J. Subpart AAAAA PSH[12] operations stack emissions .... 7% opacity

K. Subpart AAAAA PSH operations fugitive emissions .... 10% opacity

L. All other points sources .... 20% opacity

M. Fugitive dust (See Condition #21)

Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9.

For sources that are subject to NSPS, opacity shall be determined by conducting observations in accordance with 40 CFR 60.11(b) and 40 CFR 60, Appendix A, Method 9.

Visible emissions from haul road traffic shall be minimized in accordance with the fugitive dust control plan specified in Condition #17.

14. Graymont shall make at least one visual opacity survey each quarter for each kiln drive engine. The visual opacity survey shall be performed while the unit is operating by an individual trained on the observation procedures of 40 CFR 60, Appendix A, Method 9.

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12 - PSH is defined as Processed Stone Handling

The individual is not required to be a certified visual emissions observer (VEO). If visible emissions are observed from an emission unit, an opacity determination of that emission unit shall be performed by a certified observer within 24 hours of the initial survey. The opacity determination shall be performed in accordance with 40 CFR 60, Appendix A, Method 9. Graymont shall maintain a log of the visual opacity surveys, opacity determinations, and all data required by 40 CFR 60, Appendix A, Method 9.

15. The following combined lime production limits for the five (5) kilns, the Sugar Stone System, operation of the portable crushing system and truck hauling shall not be exceeded

A. For Kilns #1, #2, #3, #4 and #5 collectively:

1) 1,516,250 tons lime per rolling 12-month period

2) 4,706 tons lime per day

B. Sugar Stone System

1) 135,000 tons of sugar stone per rolling 12 month period

2) 1,000 hours of operation for the 100 hp generator per rolling 12 month period

C. Portable Crushing System

1) 750,000 tons of limestone per rolling 12 month period

2) 4,000 hours of operation per rolling 12 month period

D. Truck hauling of stone from the quarry to the plant

No more than 108 rounds trips per day (midnight to midnight) 24-hour period.

Compliance with the above 12-month production limitations shall be determined on a rolling 12-month total. Calculations for the 12-month production shall be completed within 25 calendar days from the end of the previous month. Records of production shall be kept for all periods when the plant is in operation. Production shall be determined by plant production records. Portable crusher system shall be determined by records of operation. The truck hauling shall be determined by records of operation. The records shall be kept on a daily basis.

Roads and Fugitive Dust

16. Kiln #2's ID fan motor rate shall not exceed 1,800 rpm. The Fan Tachometer readings shall be observed and logged once per day.

17. Graymont shall abide by a fugitive dust control plan acceptable to the Executive Secretary for control of all dust sources associated with the Cricket Mountain Plant. Graymont shall abide by the most current fugitive dust control plan approved by the Executive Secretary.

18. The main haul road and the sales road shall be chemically treated to stabilize the road surface at least three times per year. More frequent applications shall be applied, if necessary or required by the fugitive dust control plan or the Executive Secretary. Records of chemical treatment shall be kept for all periods when the plant is in operation similar to the records required in Condition #20 below.

19. The ½-mile portion of the main haul road, closest to the plant, shall be swept at least once every 30 days. Additional sweeping shall be required, if necessary, as determined by the responsible plant personnel or the Executive Secretary.

20. All unpaved roads and other unpaved operation areas that are used by mobile equipment shall be water sprayed and/or chemically treated to control fugitive dust. Treatment shall be of sufficient frequency and quantity to maintain the surface material in a damp/moist condition, such that the opacity shall be minimized at all times the areas are in use or unless it is below freezing. Records of water treatment shall be kept for all periods when the plant is in operation. The records shall include the following items:

    A. Date

    B. Number of treatments made, dilution ration, and quantity

    C. Rainfall received, if any, and approximate amount

    D. Time of day treatments were made

21. Additional haul road limitations shall include vehicle speed limitations as follows:

    A. Twenty five (25) mph within the plant and in the vicinity of the crusher in the quarry area.

    B. Forty (40) mph within 1.5 miles of either the plant or the quarry on the quarry road.

    C. Fifty (50) mph outside of the 1.5 mile distance point of the plant or quarry on the quarry road.

    D. Forty (40) mph between the plant and the paved highway.

    The haul road speed shall be posted.

22. Graymont shall abide by all applicable requirements of R307-205 for Fugitive Emission and Fugitive Dust sources. The full text of R307-205, Emission Standards: Fugitive Emissions and Fugitive Dust is included as Appendix A. However, to be in compliance, this source must operate in accordance with the most current version of R307-205.

Work Practices

23. Water sprays or chemical dust suppression sprays shall be installed at the following limestone handling points, if otherwise uncontrolled, to control fugitive emissions:

    A. Crushers

    B. Screens (emissions not controlled by a baghouse)

    C. Conveyor transfer points

    The sprays shall operate whenever dry conditions warrant or as determined necessary by the Executive Secretary, such that the limitations in Condition #13 will not be exceeded, unless the ambient temperature is below freezing.

24. Graymont shall minimize the drop distance from the radial stackers to the stockpiles by stockpile building procedures of building to the top and side of the established part of the pile except for the initial pile building.

25. During start-up procedures, the baghouses for Kilns #1, #2, #3, #4, and #5 shall be allowed to be bypassed while burning start-up fuels (propane, diesel). Baghouse bypassing is allowed for 7 hours after coal firing is commenced. If bypassing a baghouse occurs more than 7 hours after coal firing is commenced, Graymont shall follow the notification requirements listed in R307-107-2, UAC. In addition if the baghouse is not in service within the 7 hour limit. Graymont shall:

    A. Record each occurrence in a log

    B. Calculate the excess emissions

    C. Show justification for failure to have the baghouse in service

    D. Submit an annual report of the occurrences of excess emissions and justification by January 31 of the following year

    E. Include the excess emissions in the emissions inventory

26. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Executive Secretary which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded, and the records shall be maintained for a period of five (5) years. Maintenance records shall be made available to the Executive Secretary or Executive Secretary's representative upon request.

Fuels

27. Graymont shall use coal as the primary fuel, except a combination of coal and petroleum coke (pet coke) may be used in Kilns #1 and #5, and propane and fuel oil as a startup fuel in all kilns. Prior to burning petroleum coke in Kilns #1 and #5 or coal with a sulfur content in excess of 1.0 lb/MMBTU in Kilns #1, #2, #3, #4, or #5, an SO_2 CEM must be installed, certified, and operating on that kiln in accordance with Condition 34.

28. Graymont shall use propane, diesel, and used oil in any combination in the direct fire heating system for the limestone grinding plant.

29. The sulfur content of any coal or any mixture of coals burned shall not exceed 1.0 pounds of sulfur per MMBTU heat input. Sulfur content shall be determined by Graymont Western or the coal supplier using ASTM Method D-3177-75, D-3174-03, D-3176-89, D-4239-94, D-55016-95 or an approved equivalent ASTM Method. If Graymont chooses supplier certification, the sulfur content shall be tested quarterly from a composite sample. If Graymont chooses to test the sulfur content of the coal, the composite sample shall be tested quarterly from a composite grab sample taken every 24 hours of operation. Records, or supplier furnished certifications, of this testing shall be kept on-site for a period of five (5) years and be provided to the Executive Secretary upon request.

    After a SO_2 CEMS has been installed, calibrated, and is operating on a kiln, the coal that is burned in that kiln is exempt from the 1.0 pounds of sulfur per MMBTU heat input limitation of UAC R307-203-1(1).

30. The sulfur content of any fuel oil burned shall not exceed 0.85 pounds of sulfur per MMBTU heat input. Sulfur content shall be decided by ASTM Method D-3175-75, or an approved equivalent. The sulfur content shall be tested if directed by the Executive Secretary.

31. The air heating combustor burning used oil for energy recovery shall comply with the following:

    A. The concentration/parameters of contaminants in any used oil burned as fuel shall not exceed the following levels:

        1) Arsenic ....5 ppm by weight

        2) Cadmium ....2 ppm by weight

        3) Chromium ....10 ppm by weight

        4) Lead.....................................100 ppm by weight

        5) Total halogens ....1,000 ppm by weight

        6) Sulfur.......................................0.50 percent by weight

B. The flash point of all used oil to be burned as fuel shall not be less than 100 °F.

C. Used oil that <u>does not exceed</u> any of the listed contaminants content may be burned. The owner/operator shall record the quantities of oil burned.

D. Sources utilizing used oil as a fuel shall comply with the State Division of Solid and Hazardous Waste in accordance with R315-15, UAC.

Federal Limitations and Requirements

32. In addition to the requirements of this AO, all applicable provisions of 40 CFR 60, New Source Performance Standards (NSPS) Subpart A (General Provisions), Subpart Y (Standards of Performance for Coal Preparation Plants), Subpart HH (Standards of Performance for Lime Manufacturing Plants), Subpart OOO (Standards of Performance for Nonmetallic Mineral Processing Plants) and NESHAP 40 CFR 63 Subpart AAAAA (Lime Manufacturing Plants) apply to this installation.

Monitoring - General Process

33. Graymont shall install, calibrate, maintain, and continuously operate a continuous emissions monitoring system for the continuous measurement of opacity on kiln stacks[13] #1, #2, #3, #4 and #5. The owner/operator shall record the output of the system for measuring the opacity of emissions. The monitoring system shall operate continuously in accordance with the DAQ Policy Document for Continuous Emission Monitoring Systems. The monitoring system shall comply with all applicable sections of R307-170, UAC and 40 CFR 60, Appendix B, Specification 1 - Opacity.

34. Graymont shall install, calibrate, maintain, and continuously operate a continuous emissions monitoring system (consisting of a SO_2 pollutant concentration monitor and a flow monitoring device) for the continuous measurement of SO_2 emissions on a kiln if that kiln burns pet coke or coal with a sulfur content in excess of 1.0 lb Sulfur/MMBtu.

The owner/operator shall record the output of the system for measuring SO_2 emissions. The monitoring system shall operate continuously in accordance with the DAQ Policy Document for Continuous Emissions Monitoring Systems. The monitoring system shall comply with all applicable sections of R307-170, UAC and 40 CFR 50 Appendix B, Performance Specifications 2 – SO_2 and NO_x Continuous Emission Monitoring Systems.

35. When a SO_2 CEMS has been installed calibrated, and is operating, the emission rate of SO_2 in pounds per hour measured by the SO_2 CEMS for each 3-hour block averaging period will be calculated by the following formula:

$$E_h = K \times C_{hp} \times Q_{hs} \times \left(\frac{100 - \%H_2O}{100} \right)$$

13 - Kiln #1 shall have an opacity monitor installed and certified within 180 days of the baghouse installation.

Where: E_h = hourly SO_2 mass emission rate during unit operation, lb/hour
$K = 1.66 \times 10\text{-}7$ for SO2, lb/scf/ppm
C_{hp} = hourly average SO_2 concentration during unit operation, ppm (dry)
Q_{hs} = hourly average volumetric flow rate during unit operation, scfh (wet)
$\%H_2O$ = constant moisture value specific to each kiln, percent by volume

36. All continuous opacity monitoring devices as required in federal regulations and state rules shall be installed and operational prior to placing the affected source in operation. SO_2 CEMS shall be installed and operational on a kiln prior to that kiln burning coal with a sulfur content in excess of 1.0 lb Sulfur/MMBtu or burning pet coke.

    Except for system breakdown, repairs, calibration checks, and zero and span adjustments required under 40 CFR 60.13(d), the owner/operator of an affected source shall continuously operate all required continuous monitoring devices and shall meet minimum frequency of operation requirements as outlined in 40 CFR 60.13(e) and R307-170, UAC.

37. The Executive Secretary shall consider the continuous monitoring requirements to be met when the following provisions are met:

    A. Opacity Monitors and SO_2 CEMS

        1) Shall operate in accordance with 40 CFR 60.13 and R307-170 UAC.

    B. Excess Emission Requirements

        1) At no time shall Graymont allow excess gaseous emissions to be emitted to the atmosphere, except as provided by the provisions of R307-107 (Unavoidable Breakdowns), UAC.

        2) The Executive Secretary shall consider the source to be in compliance with SO_2 emission limits when the following provisions are met:

            a. Prior to installation of a SO_2 CEMS on a kiln, the average of three one-hour stack test results are less than the corresponding SO_2 emission limit for that kiln.

            b. After installation of the SO_2 CEMS on a kiln, the 3-hour block average is less than the corresponding SO_2 emission limit for that kiln.

            c. Three-hour block averages will begin on 12:01 am and end every 3 hours, thereafter.

    C. Reporting

        1) All sources required to install a continuous emission monitor shall submit a quarterly report in an electronic format provided by the DAQ.

2) All exceedances are to be reported in the quarterly report with explanations (R307-170-8 Reason Categories, UAC) and corrective actions.

Records & Miscellaneous

38. Graymont shall comply with R307-150 Series. Inventories, Testing and Monitoring.

39. Graymont shall comply with R307-107. General Requirements: Unavoidable Breakdowns.

The Executive Secretary shall be notified in writing if the company is sold or changes its name.

This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including R307.

A copy of the rules, regulations and/or attachments addressed in this AO may be obtained by contacting the Division of Air Quality. The Utah Administrative Code R307 rules used by DAQ, the Notice of Intent (NOI) guide, and other air quality documents and forms may also be obtained on the Internet at the following web site:

http://www.airquality.utah.gov/

The annual emissions estimations below include point source, fugitive emissions, fugitive dust, road dust, and tail pipe emissions. These emissions are for the purpose of determining the applicability of Prevention of Significant Deterioration, non-attainment area, Maintenance area, and Title V source requirements of the R307. They are not to be used for determining compliance.

The Potential To Emit (PTE) emissions for this source (the entire plant) are currently calculated at the following values:

Pollutant		Tons/yr
Particulate		1114.23
PM_{10}		610.86
SO_2		761.24
NO_x		3884.17
CO		7817.80
VOC		116.35
HAPs		
	HCL	17.29
	Chlorine	6.545
	Formaldehyde	5.039
	Hydrogen Chloride	4.910
	Hexane	1.015
	Hydrogen Flouride	0.078
	Chromium	0.607
	Lead	0.602
	Cobalt	0.577
	M & P-Xylene	0.508

Toluene	0.446
Benzene	0.416
Isomers of Hexane	0.268
Ethylbenzene	0.244
Manganese	0.273
Nickel	0.211
Selenium	0.201
O-Xylene	0.112
Arsenic	0.044
Cadmium	0.029
Mercury	0.032

Approved By:

M. Cheryl Heying, Executive Secretary
Utah Air Quality Board

Appendix A

R307. Environmental Quality, Air Quality.
R307-205. Emission Standards: Fugitive Emissions and Fugitive Dust.
R307-205-1. Applicability.

(1) Except where otherwise specified, R307-205 applies statewide.

(2) The provisions of R307-205 shall not apply to any sources for which limitations for fugitive dust or fugitive emissions are assigned pursuant to R307-401, R307-305, or R307-307 nor shall they apply to agricultural or horticultural activities.

(3) The following definitions apply throughout R307-205:

"Material" means sand, gravel, soil, minerals or other matter which may create fugitive dust.

"Road" means any public or private road.

R307-205-2. Fugitive Emissions.

Fugitive emissions from sources in areas outside Davis, Salt Lake and Utah Counties, Ogden City and any nonattainment area for PM10 and which were constructed before April 25, 1971, shall not exceed 40% opacity. Fugitive emissions from sources constructed after April 25, 1971, shall not exceed 20% opacity.

R307-205-3. Fugitive Dust.

(1) Storage and Handling of Aggregate Materials. Any person owning, operating or maintaining a new or existing material storage, handling or hauling operation shall minimize fugitive dust from such an operation. Such control may include the use of enclosures, covers, stabilization or other equivalent methods or techniques as approved by the executive secretary.

(2) Construction and Demolition Activities.

(a) Any person engaging in clearing or leveling of land greater than one-quarter acre in size, earthmoving, excavation, or movement of trucks or construction equipment over cleared land greater than one-quarter acre in size or access haul roads shall take steps to minimize fugitive dust from such activities. Such control may include watering and chemical stabilization of potential fugitive dust sources or other equivalent methods or techniques approved by the executive secretary.

(b) The owner or operator of any land area greater than one-quarter acre in size that has been cleared or excavated shall take measures to prevent fugitive particulate matter from becoming airborne. Such measures may include:

(i) planting vegetative cover,
(ii) providing synthetic cover,
(iii) watering,
(iv) chemical stabilization,
(v) wind breaks, or
(vi) other equivalent methods or techniques approved by the executive secretary.

(c) Any person engaging in demolition activities including razing homes, buildings, or other structures or removing paving material from roads or parking areas shall take steps to minimize fugitive dust from such activities. Such control may include watering and chemical stabilization or other equivalent methods or techniques approved by the executive secretary.

R307-205-4. Roads.

(1) Any person planning to construct or operate a new unpaved road which is anticipated to have an average daily traffic volume of 150 vehicle trips per day or greater, averaged over a consecutive five day period,shall submit a notice of intent to construct or operate such a road to the executive secretary pursuant to R307-401. Such notice shall include proposed action to minimize fugitive dust emissions from the road.

(2) The executive secretary may require persons owning, operating or maintaining any new or existing road, or having right-of-way easement or possessory right to use the same to supply traffic count information as determined necessary to ascertain whether or not control techniques are adequate or additional controls are necessary.

(3) Any person who deposits materials which may create fugitive dust on a public or private paved road shall clean the road promptly.

R307-205-5. Mining Activities.

(1) Fugitive dust, construction activities, and roadways associated with mining activities are regulated under the provisions of R307-205-5 and not by R307-205-3 and 4.

(2) Any person who owns or operates a mining operation shall minimize fugitive dust as an integral part of site preparation, mining activities, and reclamation operations.

(3) The fugitive dust control measures to be used may include:

(a) periodic watering of unpaved roads,
(b) chemical stabilization of unpaved roads,
(c) paving of roads,
(d) prompt removal of coal, rock minerals, soil, and other dust-forming debris from roads and frequent scraping and

compaction of unpaved roads to stabilize the road surface,

(e) restricting the speed of vehicles in and around the mining operation,

(f) revegetating, mulching, or otherwise stabilizing the surface of all areas adjoining roads that are a source of fugitive dust,

(g) restricting the travel of vehicles on other than established roads,

(h) enclosing, covering, watering, or otherwise treating loaded haul trucks and railroad cars, to minimize loss of material to wind and spillage,

(i) substitution of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subject to wind erosion,

(j) minimizing the area of disturbed land,

(k) prompt revegetation of regraded lands,

(l) planting of special windbreak vegetation at critical points in the permit area,

(m) control of dust from drilling, using water sprays, hoods, dust collectors or other controls approved by the executive secretary.

(n) restricting the areas to be blasted at any one time,

(o) reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization,

(p) restricting fugitive dust at spoil and coal transfer and loading points,

(q) control of dust from storage piles through use of enclosures, covers, or stabilization and other equivalent methods or techniques as approved by the executive secretary, or

(r) other techniques as determined necessary by the executive secretary.

(4) Any person owning or operating an existing mining operation in an actual area of nonattainment for particulate or an existing mining operation outside an actual area of nonattainment from which fugitive dust impacts an actual area of nonattainment for particulate shall submit plans for control of fugitive dust from such operations to the executive secretary for approval no later than September 29, 1981, 180 days after the effective date of this regulation.

R307-205-6. Tailings Piles and Ponds.

(1) Fugitive dust, construction activities, and roadways associated with tailings piles and ponds are regulated under the provisions of R307-205-6 and not by R307-205-3 and 4.

(2) Any person owning or operating an existing tailings operation where fugitive dust results from grading, excavating, depositing, or natural erosion or other causes in association with such operation shall take steps to minimize fugitive dust from such activities. Such controls may include:

(a) watering,

(b) chemical stabilization,

(c) synthetic covers,

(d) vegetative covers,

(e) wind breaks,

(f) minimizing the area of disturbed tailings,

(g) restricting the speed of vehicles in and around the tailings operation, or

(h) other equivalent methods or techniques which may be approvable by the executive secretary.

(3) Any person owning or operating an existing tailings operation in a nonattainment area for particulate or an existing mining operation outside an actual area of nonattainment from which fugitive dust impacts an actual area of nonattainment for particulate shall submit plans for control of fugitive dust from such operations to the executive secretary for approval no later than September 29, 1981, 180 days after the effective date of this regulation.

KEY: air pollution, fugitive emissions*, mining*, tailings*

1999	**19-2-101**
	19-2-104
	19-2-109

Appendix ~~B~~C

Baseline Studies for the Big Sage Project

ARCON ARCHAELOGICAL RESEARCH CONSULTANTS

July 12, 1994 1994b

Mr. Vic Kastner, Quarry Supervisor
Continental Lime Inc.
Cricket Mountain Unit
P.O. Box 669
Delta, Utah 84624

Re: Cricket Mountain Quarry 1994 Tract C Expansion
Cultural Resources Survey in Millard County, Utah

Dear Mister Kastner:

As per your request ARCON has conducted a cultural resources inventory of Tract C totaling 500 acres in the Cricket Mountain Quarry area of Millard County, Utah.

The survey was completed June 14-17, 1994. Thirteen cultural resource sites were identified and evaluated during the survey. A copy of ARCON's report is attached and copies have been forwarded to concerned government regulatory agency at the Fillmore BLM Area Office and the State Historic Preservation Office.

An invoice for this work as per purchase order No. CM 0301 for Parcel C is enclosed. Please contact me if you have any questions.

Sincerely,

V. Garth Norman

V. Garth Norman
Director

3rd Survey

Enclosure

CC: Nancy Shearim, Fillmore BLM Resource Area Archaeologist
Jim Dykman, State Historic Preservation Office

232 East 300 North
American Fork, Utah 84003
(801) 756-3112

UTAH STATE HISTORIC PRESERVATION OFFICE
PROJECT SUMMARY FORM

PROJECT NAME: Cricket Mountains Quarry 1994 Expansion Plan

STATE PROJECT NO.: U-94-AK-309b

SURVEY ORGANIZATION: ARCON

PRINCIPAL INVESTIGATOR: V. Garth Norman

FIELD SUPERVISOR (S): V. Garth Norman

ACREAGE SURVEYED

INTENSIVE: 500 ACRES RECON/INTUITIVE:_____ACRES

7.5' SERIES USGS MAP REFERENCE (S):

SITES REPORTED	COUNT	SMITHSONIAN SITE NOS.
ARCHAEOLOGICAL SITES		
REVISITS (NO INVENTORY UPDATE)	__0__	___________
REVISITS (UPDATED IMACS ATTACHED)	__0__	___________
NEW RECORDINGS (IMACS ATTACHED)	__13_	42Md1138-42Md1150
TOTAL ARCHAEOLOGICAL SITES	__13_	
HISTORIC STRUCTURES (106 SITE INFO ATTACHED)	__0__	
TOTAL NATIONAL REGISTER ELIGIBLE SITES	10	42Md1138-42Md1141 42Md1144-42Md1149

CHECKLIST OF REQUIRED ITEMS

1. _X_ 1 COPY OF THE FINAL REPORT
2. _X_ 7.5' SERIES USGS MAP W/SURVEY/EXCAVATION MARKED
3. _X_ COMPLETED IMACS SITE INVENTORY FORMS, INCLUDED
   _X_ PARTS A AND B OR C,
   _X_ IMACS ENCODING FORM,
   _X_ SITE SKETCH MAP,
   _X_ PHOTOGRAPHS,
   _X_ 7.5' SERIES USGS MAP W/SITE LOCATION
   _X_ MARKED AND LABELLED W/SMITHSONIAN SITE NUMBER
4. _X_ COMPLETED "COVER SHEET" W/FINAL REPORT AND FORMS

ARCON ARCHAELOGICAL RESEARCH CONSULTANTS

June 12, 1994

Subject: Cricket Mountain Quarry 1994 Tract C Expansion Cultural Resources Survey in Millard County, Utah

Project: Continental Lime Inc. Survey (CLI-94-2) by ARCON

Permit: BLM Antiquities Permit No. 93Ut576532
SHPO Project No. U-94-AK-309b
Warm Springs BLM Resource Area Office (5-24-94)

Author: V. Garth Norman

Mailing: Vic Kastner, Continental Lime Inc.
Nancy Shearim, Fillmore BLM Resource Area Office
Jim Dykman, Utah State Historic Preservation Office

ABSTRACT

On June 14-17, 1994, ARCON conducted a cultural resources survey of a 500-acre parcel of BLM land (Tract C) for an expansion plan of the Cricket Mountain Quarry in Millard County, Utah. The survey was requested and detailed in the field by Mr. Vic Kastner, Quarry Supervisor for Continental Lime Inc., and authorized by the State Historic Preservation Office, Antiquities Section, and the Warm Springs BLM Resource Area Office at Fillmore, Utah.

Thirteen cultural resource sites identified and evaluated during the survey consist of eight prehistoric rock shelters, two open lithic scatters, and three sheep camps. The ten prehistoric sites have potential for yielding further significant cultural data, and are judged to have National Register quality potential significance. ARCON recommends a cultural resources clearance be granted to Continental Lime Inc. based upon avoidance of the ten prehistoric sites during construction.

232 East 300 North
American Fork, Utah 84003
(801) 756-3112

U.S.	1	For BLM Use Only
Department of the Interior	1	BLM Report ID No.
Bureau of Land Management	1	
Utah State Office	1	Report Acceptable Yes__ No__
	1	Mitigation Acceptable Yes__ No__
Summary Report of Inspection	1	Comments:________________
for Cultural Resources	1	________________

1. Report Title: Cricket Mountain Quarry Tract C 1994 Development
2. Development Company: Continental Lime Inc.
3. Report Date: 7-12-94 4. BLM Antiquities Permit No. 93Ut576532
SHPO Project No. U-94-AK-309b
5. Responsible Institution: ARCON. County: Millard
6. Fieldwork Location: TWN 22 S, Range 10 W, Sections 3, 10, 15

7. Resource Area: Warm Springs (Fillmore)

8. Description of Examination Procedures: The survey was conducted by archaeologists walking parallel or zigzag transects about 15 meters apart, with wider transcects on steep slopes. Areas of higher site potential (ridges, saddles, benches, rock outcroppings) were examined more intensively. Archaeological sites were tested for cultural deposition.

9. Linear Miles Surveyed: None 10. Inventory Type: I
Legally Definable Acres Surveyed: 500

11. Description of Findings: 12. Number Sites Found: 13
(See page 2.) 13. Collection: N

14. Actual/Potential National Register Properties Affected: 10

15. Literature Search, Location/date: SHPO, 5-23-94; Fillmore Warm Springs Area Office 5-25-94. A review of the State Historic Preservation files, and the Warm Springs Resource Area Office files with Nancy Shearim indicate no prior cultural resource surveys or recorded sites in the study area. A paleontological records search was negative.

16. Conclusions/Recommendations:

Eight rock shelters and two lithic scatters have National Register quality potential. It is recommended that future study of these sites compare lithics and any other remains from the open lithic sites to help construct the prehistory as part of a new Cricket Mountain regional research design involving subsistence hunting gathering strategies. A variety of possible uses of rock shelters including habitation, burial, cache, and temporary hunting shelter should also be examined as part of a research design in any future mitigation of archaeological sites that may be undertaken if construction impacts are anticipated. (See 16 cont'd below.)

17. Signature V Garth Norman

11. (cont'd). Cultural resource sites identified and evaluated during the survey consist of eight rock shelters, two open lithi scatters, and three sheep camps. The prehistoric sites contain potential for yielding further significant cultural data. Individual site descriptions and evaluations follow.

Site Descriptions

Site 42Md1138--Rock Shelter. A rock shelter 2 m. deep, 1 m. wide, and 1.5 m. high faces east at the base of a rock outcrop located 20 m. above a draw on a north facing slope. The doorway is .75 m. high. It contains a large pack rat midden, partly disturbed by mammals, and charcoal from an old midden burned intentionally or naturally by a range fire. The floor contains at least 20 cm. of fill. Other than the charcoal no surface signs of possible human occupation could be detected. Careful inspection down slope did not detect lithic remains. The floor was probed but not adequately tested for human remains, due to the extent of the pack rat midden. The suitability of the shelter for temporary human occupation, cache storage, or grave burial warrants a judgement that it could have been utilized by seasonal hunters. This site has National Register potential.

Site 42Md1139--Lithic Scatter. Visible remains of this sparse lithic scatter are limited to a 2 X 6 meter area on the south edge of a saddle. Obsidian lithic debris include a retouched utilized flake, a decortation scraper, a secondary flake and a tertiary flake. Concentrated but limited remains and soil conditions suggest more extensive lithics covered by erosion of a kill butcher and lithic preparation site. Random shovel tests on the saddle did not expose any sub-surface cultural remains. This site has National Register potential.

Site 42Md1140--Rock Shelter. This shelter is a round geologic tub on the side of a limestone cliff, with water formed limestone encrustation and stalactites. The tube descends at about 20 degrees for 10 meters to its rear floor level with deep wind blown soil fill. The roof at the entrance is 3 meters high, and there is a 2 X 3 meter platform floor at the entrance which is about 2 meters above the present talas slope at the base of the limestone cliff formation. Possible human bones from a disturbed burial were on the surface, and were reinturned for preservation. Remnants of a packrat midden are eroded into the lower entrance floor. Bits of charcoal and smoke blackened walls indicate possible human occupation, and/or a past burned pack rat midden from a range fire. No lithic remains could be detected. A shovel test to 20 cm. in the shelter interior confirms deeper deposition. A large mammal tooth 4 cm. long above the gum line was exposed in the test. This site has National Register potential.

Site 42Md1141--Rock Shelter. This large rock shelter facing south measures 2.5 meters wide and 6 meters deep. The shelter is well protected by a 15 meter long natural limestone wing wall to the front west. A distinctive feature of this shelter is a protected ledge about 8 meters directly above the shelter that can be reached through a hole in the cliff on the north of the cave, which could have been used as a lookout. A shovel test in one of two vandal pits penetrated 60 cm. to bedrock, exposing a compacted floor at a depth of about 10 cm. with charcoal sand mix blow that containing an obsidian flake. The lower level is sandy loam and rock mix. Scattered obsidian flakes are on the surface. The roof is fire blackened. Historic occupation remains consist of a rock lined fire pit, and a burnt log wrapped with bailing wire. This site has National Register quality.

Site 42Md1142--Sheep Camp. This sheep camp is located east of the road in the north end of Big Sage Valley on a confluence between two intermittent washes. Trash from the sheep camp consists of a variety of food tin cans, a 5 gal gas can, a motor oil can, and two pint paint cans. The paint cans were probably used for paint branding sheep. The cans were mostly disgarded in the wash to the east and north of the camp site, and a few isolated cans are located west across the road and on up the wash to the NW about 50 meters. This site lacks National Register quality.

Site 42Md1143--Sheep Camp. This sheep camp consists of three units that extend from a draw eastward along an alluvial fan to the interrior western edge of Big Sage Valley. The oldest unit on the west by a juniper stand measures 5 X 15 meters (see photo center), and consists of about a dozen tin cans including a double hole solder can dating from the early 1900's. Another small limited use camp just east of the road consists of a solder hole milk can, a medecine bottle, 2 Prince Albert cans, wood chips, and a depression. The main camp unit in the center measuring 30 X 60 meters had more extended use, with a variety of over 20 cans, glass bottles, a wash pan, barrel strap rings, a rock lined fire pit, and fire wood chips. The site lacks National Register quality.

Site 42Md1144--Rock Shelter. The interrior of this rock shelter is 3 meters wide and 3 meters deep, and the floor tapers and slopes up at about 5 degrees to the narrow back. A large window 1.5 meters above the doorway (see photo), measuring 1 meter high by 0.75 meter wide, opens to a terrace on the inner west side of the shelter. The inside ceiling measures up to 2 meters high. Between 20-30 cm. of mostly loose fill inside the shelter has resulted mostly from material brought in by a variety of occupants including pack rats, chipmonks, birds, bats, snakes, and larger mammals as indicated by feces. Bones observed include small species as well as larger mammals. Charcoal bits are in soil at the entrance, but spalling has removed any trace of smoke blackend interrior. There are abundant fresh juniper twigs on the floor from animal activity. The site has National Register potential.

Site 42Md1145--Rock Shelter. A small rock shelter 2 meters dee and 0.75 meters wide with a high stand-up ceiling has bat guano in one section, also a bird nest, and a pack rat midden. The level floor is 0.5 meter below the outside entrance. The shelte is located on a north face slope of a large ridge that extends east from Cricket Mountains into Big Sage Valley. No definite proof of human occupation was observed, but the shelter is suitable for temporary occupation, burial, or cache, and should be thoroughly tested before any future impacts. The site has National Register significance.

Site 42Md1146--Rock Shelter. A rock shelter 5 meters deep, 1 meter wide, and 1 meter high faces south in a well protected recess on the south slope of a large ridge that extends east fro Cricket Mountains into Big Sage Valley. The shelter has about 3 cm. of fill above bedrock. The fill includes old dispersed pack rat midden, and a variety of old bones and charcoal. The charcoal could have resulted from either human occupation or burned out midden from a range fire. No definite proof of human occupation was observed, but it is suitable for temporary shelter, and could have been utilized for burial or cache. It should be thoroughly tested before any future construction impacts. The site has National Register potential.

Site 42Md1147--Rock Shelter. A rock shelter 3 meters deep, 1 meter wide, and 1 meter high in a rock outcrop faces south just below the summit on the western side of a NS ridge. The back of the shelter is completely filled with a large pack rat midden and actually continues 2 additional meters to a small opening in the north end. The surface area of this opening, as well as most of the main area of the shelter is smoke blackened. Over 20 cm. of fill contains burnt bone. The smoke blackend interior could have resulted from human burning or from burned out pack rat midden caused by a range fire. No definite proof of human occupation was observed, but it is suitable for temporary shelter, and could have been utilized for a burial or cache. It should be thoroughly tested before any future construction impacts. The site has National Register potential.

Site 42Md1148--Lithic Scatter. This lithic scatter is strategically located on a saddle along a game trail through a major draw that connects the southern head of Fillmore Canyon to Big Sage Valley. An ant hill on the north edge of the saddle contains tertiary flakes which indicates some erosion fill. Other lithics observed are limited to three retouched and utilized flakes of obsidian. The main ridge on the west of the saddle runs north 1.2 miles to another saddle where an isolate stemned Gypsum point base of milk white chert was identified during this survey. The site has National Register potential.

Site 42Md1149--Rock Shelter. A rock shelter 1.5 meters deep, 1 meter wide, and 1 meter high in a rimrock outcrop faces north 3 meters below the summit on the western side of a NS ridge, and is due east overlooking the saddle lithic site 42Md1148. The floor is leveled and partly compacted from mammal occupation, and the floor contains mix from a dispersed pack rat midden. The shelter roof and back are smoke blackened, and there is burnt bone in the floor fill. There appears to be artificial rock fill in the back of a possible burial or storage cache. The smoke blackend interior could have resulted from human burning or from burned out pack rat midden caused by a range fire. This shelter should be thoroughly tested for human occupation before any future construction impacts. This site has National Register potential.

Site 42Md1150--Sheep Camp. This extended use sheep camp covers about a 20 X 20 meter area on an alluvial fan at the base of a draw. Scattered trash consists of a variety of tin cans including a double solder hole can, a catsup bottle, a mustard bottle, whisky bottles, broken glass, tobacco cans, a pitch fork handle, a cooking pot, wood board, and fire wood chips. This site lacks National Register quality.

Isolated Finds

Isolated historic trash, mostly tin cans, was observed but not recorded during the survey unless some extended activity or particular interest could be attributed. Non-significant historic sites less than 50 years old were noted as isolates. Scattered historic isolated finds were primarily related to sheep herding, and mineral exploration. Tract C isolates are listed below.

Tract C Isolates

- X-1 3 solder hole tin cans of possible temporary sheep camp obscurred by wash erosion.
- X-2 Possible miner's camp near prospects in Iron Basin dating to the 1950's consists of a juniper stump with nails in the top for a missing table top, a board nailed to a tree, sheet tin, bailing wire, wire bracket, and shale slab.
- X-3 Tin cans as possible extension of sheep camp 42Md1142.
- X-4 Retouched utilized flake of obsidian.
- X-5 Miscellaneous trash of possible sheep camp dating to the 1950's.
- X-6 Stemmed Gypsum point base of milk white chert located on a saddle. (See figure.)

Discussion

The prehistoric sites are being evaluated in conjunction with sites previously recorded in the area by ARCON and the BLM, which now total 25. Identification of these sites through Continental Lime's exploration program is developing a potentially significant data base for helping construct the area's prehistory, even though temporal diagnostic remains are still limited. The isolated Gypsum point, dating to Late Archaic/Fremont times, is the only prehistoric diagnostic artifact identified during this survey, and it has been noted as an isolate in the 42Md1148 IMACS site form for the record of possibly related saddle hunting activity.

16. (Recommendations Cont'd) Mitigation data recovery on National Register quality potential sites should be considered for sites that could be impacted due to their locations in natural traffic corridors and proximity to slopes that will be strip mined. The BLM way wish to consider the potential value of some additional data recovery on lithic sites as part of a district research design plan prior to anticipated construction impacts. The National Register quality potential of sites is summarized as follows:

42Md1138	Rock Shelter	Significant
42Md1139	Lithic Scatter	Significant
42Md1140	Rock Shelter	Significant
42Md1141	Rock Shelter	Significant
42Md1142	Sheep Camp	Non-significant
42Md1143	Sheep Camp	Non-significant
42Md1144	Rock Shelter	Significant
42Md1145	Rock Shelter	Significant
42Md1146	Rock Shelter	Significant
42Md1147	Rock Shelter	Significant
42Md1148	Lithic Scatter	Significant
42Md1149	Rock Shelter	Significant
42Md1150	Sheep Camp	Non-Significant

ARCON recommends that Continental Lime Inc. be granted a cultural resources clearance for this project, with the following recommended stipulations:

1. That all construction activity be confined to the areas surveyed,

2. That the ten National Register quality sites be avoided during construction, or that mitigated be carried out prior to anticipated construction impacts,

3. That construction personnel refrain from collecting or otherwise disturbing the recorded sites, and any other significant unrecorded cultural materials that might be encountered during development.

4. That construction activities cease and the BLM archeologist be notified immediately if unrecorded cultural materials are encountered.

References

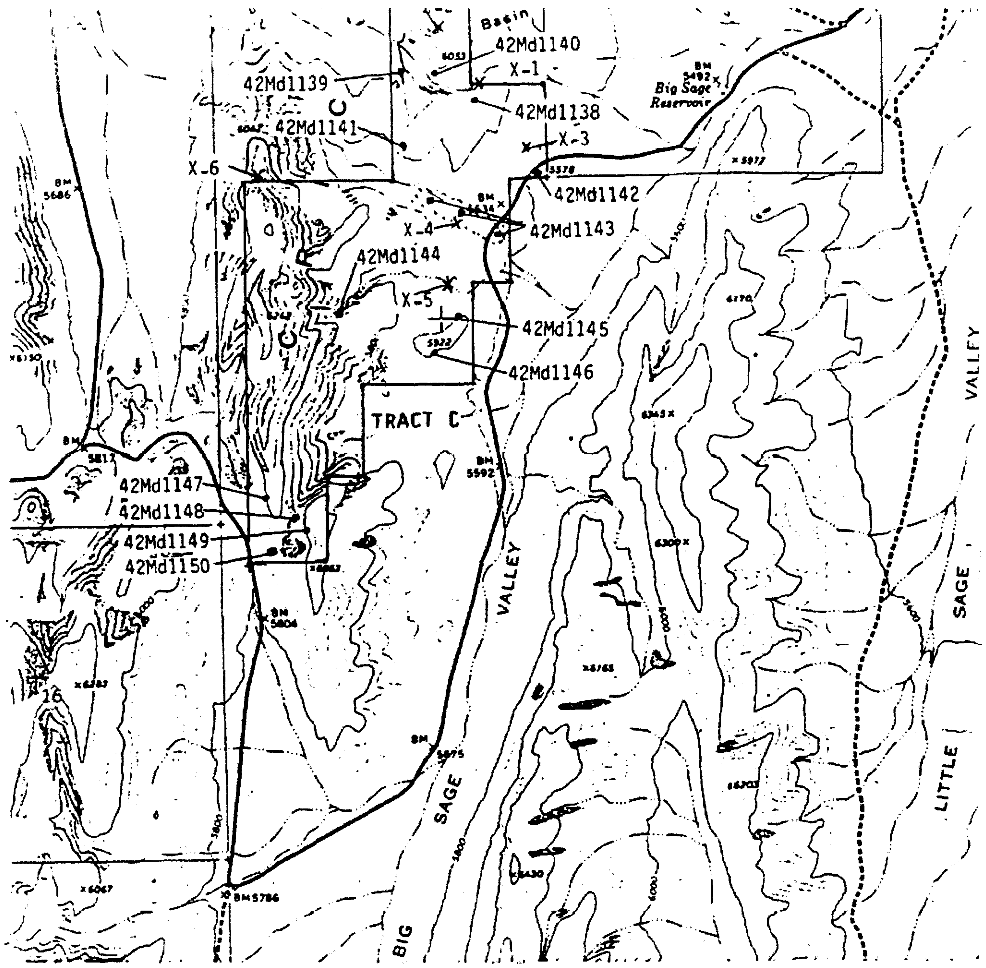
Hintze, Lehi F.
1980 Geological Map of Utah. Utah Geological and Mineral Survey. Salt Lake City.

Norman, V. Garth
1993 Cricket Mountain Quarry Expansion Cultural Resources Survey for Continental Lime Inc., Millard County, Utah. ARCON Survey, State Project No. U-93-AK-230sb, June 93.

1994 Archaeological Inventory of Cricket Mountain Quarry 1994 Expansion Plan, Tracts A & B, Millard County, Utah ARCON Survey, State Project No. U-94-AK-242b, June 94.

Shearim, Nancy
1994 Cricket Mountain Drilling. Richfield BLM District, Fillmore Office report of 4/14/94.

Stokes, William Lee
1977 Subdivisions of the Major Physiographic Provinces in Utah. Utah GEOLOGY 4(1). Utah Geological and Mineral Survey. Salt Lake City.



PROJECT MAP

Project:	Continental Lime Inc. Tract C 1994 Cricket Mountain Quarry Expansion ARCON (CLI-94-1)
County:	Millard, Utah
Location:	T 22 South, R 10 West
USGS Quad:	Candland Spring 7.5'

Key:

- ◆ Archaeological Site
- ▪ Historic Site
- X Isolated artifacts

ARCON ARCHAELOGICAL RESEARCH CONSULTANTS

1995

August 15, 1995

4Th Survey + Related docs.

Mr. Vic Kastner, Quarry Supervisor
Continental Lime Inc.
Cricket Mountain Unit
P.O. Box 669
Delta, Utah 84624

Re: Cricket Mountain Quarry 1995 Expansion Program
Cultural Resources Survey in Millard County, Utah

Dear Mister Kastner:

As per your request ARCON has conducted a cultural resources inventory of a total of nine miles of proposed access corridor and existing road improvement, and about 130 acres of intensive survey according to your directive in the Cricket Mountain Quarry area of Millard County, Utah.

The survey was completed July 6-7, 1995. Four cultural resource sites were identified and evaluated during the survey. A copy of ARCON's report is attached and copies have been forwarded along with IMACS site forms to concerned government regulatory agency at the Fillmore BLM Area Office and the State Historic Preservation Office. Also, on these dates, ARCON conducted archaeological site inspections and evaluations of previously recorded sites within anticipated development impact areas for future mitigation research design considerations.

An invoice for this work as per purchase order No. CM-1166 is enclosed. Please contact me if you have any questions.

Sincerely,

V. Garth Norman

V. Garth Norman
Director

Enclosure

CC: Nancy Shearim, Fillmore BLM Resource Area Archaeologist
James Dykman, State Historic Preservation Office
Kenneth L. Wintch, Division State Lands and Forestry

232 East 300 North
American Fork, Utah 84003
(801) 756-3112

ARCON **ARCHAELOGICAL RESEARCH CONSULTANTS**

August 15, ~~1994~~ 1995

Subject:	Cricket Mountain Quarry 1995 Expansion Program Cultural Resources Survey in Millard County, Utah
Project.	Continental Lime Inc. Survey (CLI-95-1) by ARCON
Permit:	BLM Antiquities Permit No. 95Ut57632 SHPO Project No. U-95-AK-326bs Warm Springs BLM Resource Area Office Mini Permit
Author:	V. Garth Norman
Mailing:	Vic Kastner, Continental Lime Inc. Nancy Shearim, Fillmore BLM Resource Area Office James Dykman, Utah State Historic Preservation Office Kenneth L. Wintch, Division State Lands and Forestry

ABSTRACT

On July 6-7, 1995, ARCON conducted a cultural resources survey of a total of nine miles of proposed access corridor and existing road improvement, and 130 acres of intensive survey on BLM and State administer lands for proposed expansion plan of the Cricket Mountain Quarry area in Millard County, Utah. The survey was requested and detailed in the field by Mr. Vic Kastner, Quarry Supervisor for Continental Lime Inc., and authorized by the State Historic Preservation Office, Antiquities Section, and the Warm Springs BLM Resource Area Office at Fillmore, Utah.

The inventory resulted in identification and recording of four historic sites along proposed access route development. Site 42Md1177 is a limited trash dump, possibly from ranching camp activity. Two others are ranching (sheep) camp sites (42Md1178 & 42Md1179). None of these sites have National Register quality. The fourth historic site (42Md1180) appears to be an extended seasonal campsite related to early ranching. This site has National Register quality potential based upon possible contents of the depressions to be determined through future testing. ARCON recommends that final NR determination and mitigation of 42Md1180 as may be required prior to granting a cultural resources clearance for mining development in the site area.

232 East 300 North
American Fork, Utah 84003
(801) 756-3112

UTAH STATE HISTORIC PRESERVATION OFFICE
PROJECT SUMMARY FORM

PROJECT NAME: Cricket Mountains Quarry 1995 Expansion Plan

STATE PROJECT NO.: U-95-AK-326bs

SURVEY ORGANIZATION: ARCON

PRINCIPAL INVESTIGATOR: V. Garth Norman

FIELD SUPERVISOR (S): V. Garth Norman

ACREAGE SURVEYED

INTENSIVE: 9 MILES CORRIDOR; 130 ACRES

7.5' SERIES USGS MAP REFERENCE (S): Candland Springs

SITES REPORTED COUNT SMITHSONIAN SITE NOS.

ARCHAEOLOGICAL SITES
REVISITS (NO INVENTORY UPDATE) _____ __________

REVISITS (UPDATED IMACS ATTACHED)__2__ 42Md1080, 42Md1125

NEW RECORDINGS (IMACS ATTACHED) __4__ 42Md1177-42Md1180

TOTAL ARCHAEOLOGICAL SITES __4__

HISTORIC STRUCTURES (106 SITE INFO ATTACHED) __0__

TOTAL NATIONAL REGISTER ELIGIBLE SITES __1__ 42Md1180

CHECKLIST OF REQUIRED ITEMS
1._X_ 1 COPY OF THE FINAL REPORT
2._X_ 7.5' SERIES USGS MAP W/SURVEY/EXCAVATION MARKED
3._X_ COMPLETED IMACS SITE INVENTORY FORMS, INCLUDED
_X_ PARTS A AND B OR C,
_X_ IMACS ENCODING FORM,
_X_ SITE SKETCH MAP,
_X_ PHOTOGRAPHS,
_X_ 7.5' SERIES USGS MAP W/SITE LOCATION
_X_ MARKED AND LABELLED W/SMITHSONIAN SITE NUMBER
4._X_ COMPLETED "COVER SHEET" W/FINAL REPORT AND FORMS

U.S.	1 **For BLM Use Only**
Department of the Interior	1 **BLM Report ID No.**
Bureau of Land Management	1
Utah State Office	1 **Report Acceptable Yes___No___**
	1 **Mitigation Acceptable Yes___No___**
Summary Report of Inspection	1 **Comments:_______________**
for Cultural Resources	1 _______________

1. Report Title: Cricket Mountain Quarry 1995 Development Program
2. Development Company: Continental Lime Inc.
3. Report Date: 8-15-95 4. BLM Antiquities Permit No. 95Ut57632
SHPO Project No. U-95-AK-326bs
5. Responsible Institution: ARCON. County: Millard
6. Fieldwork Location: T 21S, R 9W, Sections 32, 33; T 21S, R 10W, Sections 25, 26, 35; T 22S, R 9W, Sections 5, 6; T 22S, R 10W, Sections 1, 3, 10, 11.

State Lease Land: T 22S, R 10W, Section 2

7. Resource Area: Warm Springs (Fillmore)

8. Description of Examination Procedures: The survey was conducted by archaeologists walking two parallel transects 15 meters apart, with wider transcects on steep slopes. Areas of higher site potential (ridges, saddles, benches, rock outcroppings) were examined more intensively.

9. Linear Miles Surveyed: 9 10. Inventory Type: I
Legally Definable Acres Surveyed: 130

11. Description of Findings: (See page 2.) 12. Number Sites Found: 4 3. Collection: N

14. Actual/Potential National Register Properties Affected: One historic site.

15. Literature Search, Location/date: SHPO, 7-5-95; Fillmore Warm Springs Area Office. No other cultural resource inventories have been conducted in the study area since ARCON's 1994 inventory. A paleontological records search was negative.

16. Conclusions/Recommendations:

The inventory resulted in identification and recording of four historic sites along proposed access route developement. Site 42Md1177 is a limited trash dump, possibly from ranching camp activity. Two others are ranching (sheep) camp sites (42Md1178 & 42Md1179). None of these sites have National Register quality. The fourth historic site (42Md1180) appears to be an extended seasonal campsite related to early ranching and/or possible mineral exploration. This site has National Register quality potential based upon suspected contents of the depressions to be determined through future test excavation.

ARCON recommends that Continental Lime Inc. be granted a cultural resources clearance for this project after compliance with the following recommended stipulations:

1. That all construction activity be confined to the areas surveyed,

2. That Site 42Md1180 be tested for National Register quality significance, and mitigiated as may be required for data recovery prior to initiating mining development.

3. That construction personnel refrain from collecting or otherwise disturbing the recorded sites, and any other significant unrecorded cultural materials that might be encountered during development,

4. That construction activities cease and the BLM archeologist be notified immediately if unrecorded cultural materials are encountered.

17. Signature ______________________

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11. (cont'd). Cultural resource sites identified and evaluated during the survey consist of a sparse historic trash scatter, two ranching sheep camps, and an extended campsite with features that are described below.

Site Descriptions

Site 42Md1177--Trash Scatter. This sparce trash scatter, 200 X 25 meters, is located along the Broadmouth Canyon road off the north end of Big Sage Valley. The site consists of about 12 widely scattered cans, a single fragment of yellow-tinted glass, and a single fragment of milled wood. Two can fragments mixed in the berm dirt from grading the road indicate possible road impact of the site. The site lacks any evidence for cultural deposition and distinctive temporal diagnostic remains. This site lacks National Register quality.

Site 42Md1178--Ranching Sheep Camp. This campsite is located on a finger ridge on the south side of Broadmouth Canyon, on the north side of the graded road that partly impacts the site. The site covers an 8 X 10 meter area, and consists of Bone China sherds, two solder end-hole milk cans, and axe-cut juniper limbs. There is no evidence for cultural depth. This site lacks National Register quality.

Site 42Md1179--Ranching Sheep Camp. This site is located on an alluvial fan off the south base of a ridge, and a two track road crosses the north end of the site. The site covers a 45 X 15 meter area, and consists of solder hole tin cans, a Prince Albert tobacco can, a coffee can lid, a clear glass catsup bottle, aqua-tinted bottle glass, and fragments of milled wood, and axe-cut juniper. There are no features, and no evidence for depth. The site lacks National Register quality.

Site 42Md1180--Campsite. This site appears to be an extended seasonal campsite related to early ranching. Mining prospecting function is also possible, but no early prospects are known in this locality. The site covers a 15 X 20 meter area between two washes where two draws meet, and has been partly impacted by a graded road. The site has five features: a meter wide rock cairn in a depression, and four other depressions that are each about a meter wide. The site can be dated to the late 1800's from a double solder end tin can, and a metal box type kitchen cooking-oven stove. Based upon contents of the depressions to be determined, this site has National Register quality potential.

Isolated Finds. Isolates observed during the survey are limied to a few tin cans along the Broadmouth Canyon road side. None of these items have historic interest that dates older than 50 years, so they were not recorded.

References

Hintze, Lehi F.
1980 Geological Map of Utah. Utah Geological and Mineral Survey. Salt Lake City.

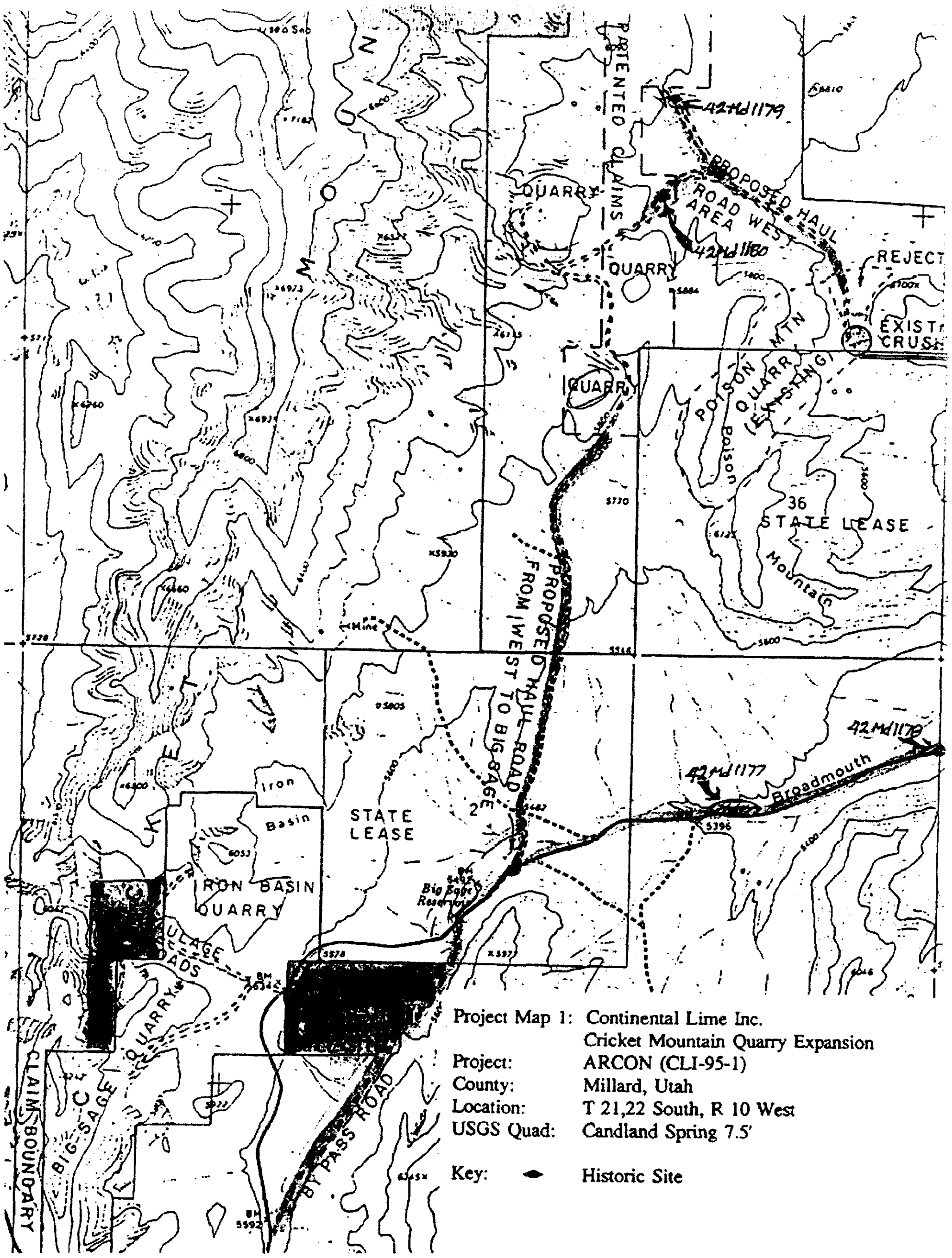
Norman, V. Garth
1993 Cricket Mountain Quarry Expansion Cultural Resources Survey for Continental Lime Inc., Millard County, Utah. ARCON Survey, State Project No. U-93-AK-230sb, June 93.

1994 Archaeological Inventory of Cricket Mountain Quarry 1994 Expansion Plan, Tracts A & B, Millard County, Utah. ARCON Survey, State Project No. U-94-AK-242b, June 94.

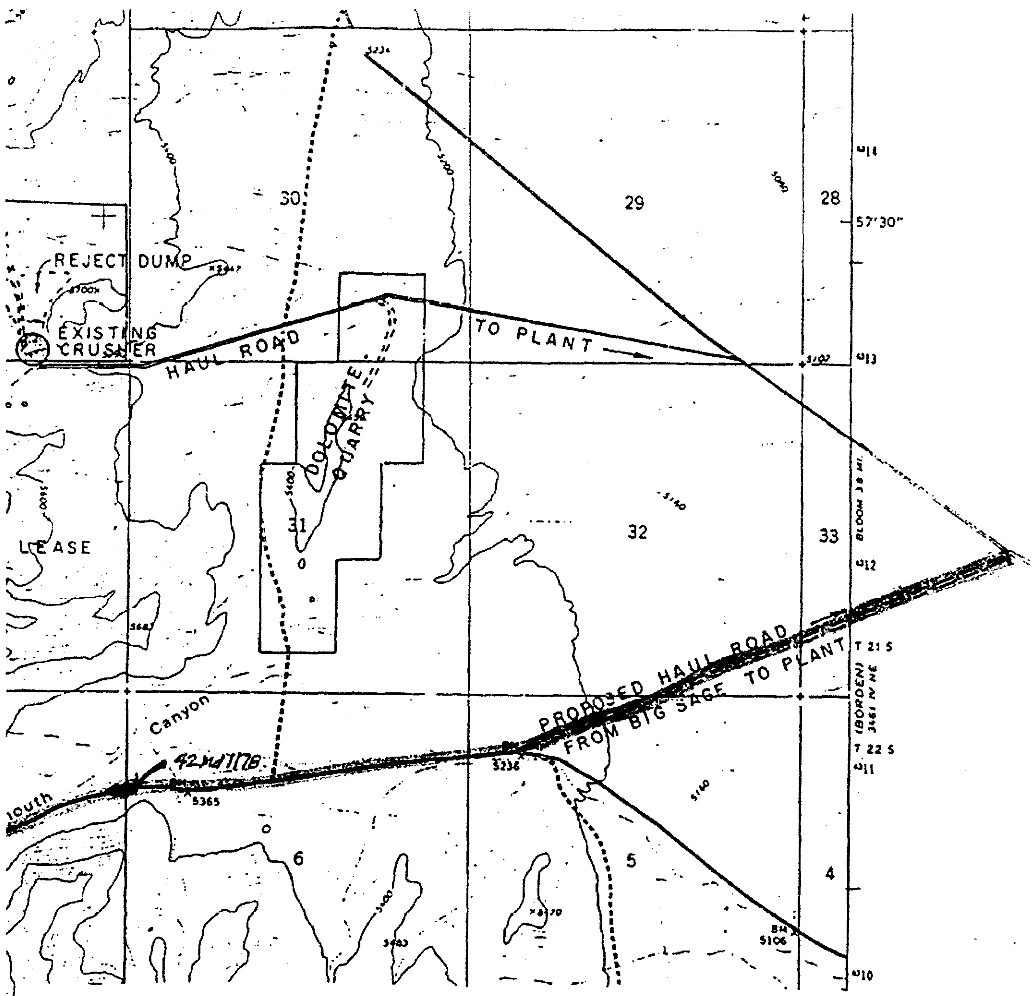
1994 Cricket Mountain Quarry 1994 Tract C Expansion Cultural Resources Survey in Millard County, Utah. ARCON Survey, State Project No. U-94-AK-309b, July 94.

Shearim, Nancy
1994 Cricket Mountain Drilling. Richfield BLM District, Fillmore Office report of 4/14/94.

Stokes, William Lee
1977 Subdivisions of the Major Physiographic Provinces in Utah. Utah GEOLOGY 4(1). Utah Geological and Mineral Survey. Salt Lake City.



Project Map 1:	Continental Lime Inc.
	Cricket Mountain Quarry Expansion
Project:	ARCON (CLI-95-1)
County:	Millard, Utah
Location:	T 21,22 South, R 10 West
USGS Quad:	Candland Spring 7.5'
Key: ◆	Historic Site



Project Map 2: Continental Lime Inc.
Cricket Mountain Quarry Expansion,
Access Road

Project:	ARCON (CLI-95-1)
County:	Millard, Utah
Location:	T 21,22 South, R 9 West
USGS Quad:	Candland Spring and Borden 7.5'

Key: ◆ Historic Site

A FINAL REPORT OF A CLASS III INVENTORY OF THE CRICKET MOUNTAIN QUARRY EXPANSION, 1996

for

CONTINENTAL LIME, INC.
Millard County, Utah

prepared by

Geoffrey Cunnar
Dawn Snell
Charles W. Wheeler
Steven F. Mehls

February 7, 1997

W C R M

WESTERN CULTURAL RESOURCE MANAGEMENT, INC.

WCRM Project No. 96026
Report No. WCRM(F)101

BLM Project U-96-WE-0519, p,s
Cultural Resource Use Permit
96UT54947 (Utah BLM)

A Final Report of a Class III Inventory of the Cricket Mountain Quarry Expansion, 1996

for

Continental Lime, Inc.
Millard County, Utah

prepared by

Geoffrey Cunnar
Dawn Snell
Charles W. Wheeler
Steven F. Mehls

submitted by

Western Cultural Resource Management, Inc.
1206 East Murray Drive
Farmington, NM 87401

Thomas J. Lennon, Principal Investigator

submitted to

Bureau of Land Management
Richfield District
House Range Resource Area
Fillmore, Utah 84631

February 7, 1997

ABSTRACT

From September 17 to September 24, 1996, Western Cultural Resource Management, Inc. (WCRM) completed a Class III cultural resource inventory of one parcel of land (Continental Lime Inc., Tract D) and portions of three additional parcels of land (Continental Lime Inc., Tracts A, C, and E) totalling 968 acres for expansion of the Continental Lime, Inc. Cricket Mountain Quarry. During the survey, 10 sites and 34 isolated occurrences were recorded. The sites and 13 additional previously recorded sites within Tract C were flagged with a 100-foot buffer zone to allow for exploratory core drilling. Based on observations made during the placement of the temporary protective flagging, boundaries of two of the previously recorded sites were modified and both sites were re-mapped. In addition, 16 sites recommended by Archaeological Research Consultants as eligible for the National Register of Historic Places were reevaluated by Western Cultural Resource Management at the request of the Bureau of Land Management, House Range Resource Area, and Continental Lime Inc. Seven of the ten new sites found during the current survey and two of the re-evaluated sites were recommended for the National Register of Historic Places (NRHP).

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INTRODUCTION

From September 17 to September 24, 1996, Western Cultural Resource Management, Inc. (WCRM) completed three tasks for Continental Lime, Inc.:

1) A Class III cultural resource inventory of one parcel of land (Continental Lime Inc., Tract D) and portions of three additional parcels of land (Continental Lime Inc., Tracts A, C, and E) totalling 968 acres for expansion of the Continental Lime, Inc. Cricket Mountain Quarry.

2) A total of 19 previously recorded sites were reevaluated. Sixteen of 33 previously recorded sites were reevaluated as directed by the scope of work, two (42Md1142, 42Md1143) were reevaluated because of observations made during flagging, one was reevaluated in error (42Md1140).

3) Twenty three sites were flagged with a 100 foot temporary buffer zone, at the request of the Bureau of Land Management (BLM), to allow for exploratory core drilling in the immediate vicinity. Thirteen of these sites were in mine Tract C (previously recorded) and 10 were newly recorded by WCRM and located in Tracts D and E.

The surveyed area and all sites investigated are located on BLM lands in the House Range Resource Area of the Richfield District. Charles W. Wheeler conducted a search of the BLM files in Fillmore, Utah on September 18, 1996. Thirty three previously recorded sites were found in the project area (Norman 1993, 1994a, 1994b, 1995), WCRM revisited 30 of these sites.

The cultural resource study was performed in compliance with the mandates for protection of archaeological resources on public land and for publicly funded or permitted projects. These mandates are put forth in the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (as amended), the National Environmental Policy Act of 1969, and the Archaeological Resources Protection Act of 1979. The current project was conducted under BLM Cultural Resource Use Permit 96UT54947 and State Project number U-96-WE-0519 p,s.

Michael Brown requested and Robert Robison administered the project for Continental Lime, Inc. Thomas J. Lennon administered the project for WCRM. WCRM archaeologists Charles W. Wheeler, Dawn Snell, and Geoffrey Cunnar acted as supervisors. Crew members included Tom Reider, Richard Walter, Oliver Patsch, and Jim Dryer. Work was discussed with Nancy Shearin, BLM House Range Resource Area archaeologist, before, during and after the project. Nancy Shearin also participated in on-site documentation of recent vandalism to a cave site (42Md1350) that WCRM recorded.

Project Location

The Continental Lime Inc., Cricket Mountain Plant is located 35 miles south of Delta, Utah. The parcels of land surveyed are located approximately 10 miles west of the plant along the flanks of the Cricket Mountains in those areas of proposed enlargement of the Continental Lime mining operation. The project area, sites, and isolates are plotted in Figures 1, 2, 3, 4 and 5. The legal descriptions of the surveyed area are provided in Table 1 and the legal descriptions of the sites are provided in Table 2 and 3. The legal location and description of isolates are provided in Table 5. The entire survey was located on mining claims situated on BLM land.

Table 1. Legal Locations of Areas Surveyed for (Candland Spring, Utah 7.5' Quad) Continental Lime, Inc.

<u>Tract A, T21S, R10W</u>			
Section 25			
Portion	SW	NW	NW
Portion	SE	NW	NW
Portion	SW	NE	NW
All	NW	SW	NW
All	NE	SW	NW
All	NW	SE	NW
Portion	NE	SE	NW
Portion	SW	SW	NW
All	SE	SW	NW
All	SW	SE	NW
All	SE	SE	NW
E½	NW	NW	SW
All	NE	NW	SW
All	NW	NE	SW
All	NE	NE	SW
All	NW	NW	SE
All	NE	NW	SE
All	NW	NE	SE
E½	SW	NW	SW
All	SE	NW	SW
Portion	SW	NE	SW
N½	SE	NE	SW
Portion	SW	NW	SE
Portion	SE	NW	SE
N½	SW	NE	SE
E½	NW	SW	SW
All	NE	SW	SW
W½	NW	SE	SW
Portion	NW	SW	SE
Portion	NE	SW	SE
E½	SW	SW	SW
All	SE	SW	SW
W½	SW	SE	SW
Portion	SW	SW	SE
Portion	SE	SW	SE
Section 26			
Portion	SE	NW	NE
Portion	SE	NE	NE
All	NE	SW	NE
E½	NE	SE	NE
Portion	SW	SW	NE
N½	SE	SW	NE
Portion	SE	SE	NE
Portion	NW	NW	SE
Portion	SW	NW	SE
Section 23			
Portion	NW	NE	SE
Portion	NE	NE	SE
Portion	SW	NE	SE
Portion	SE	NE	SE
Section 24			
Portion	NW	NW	SW
Portion	SW	NW	SW

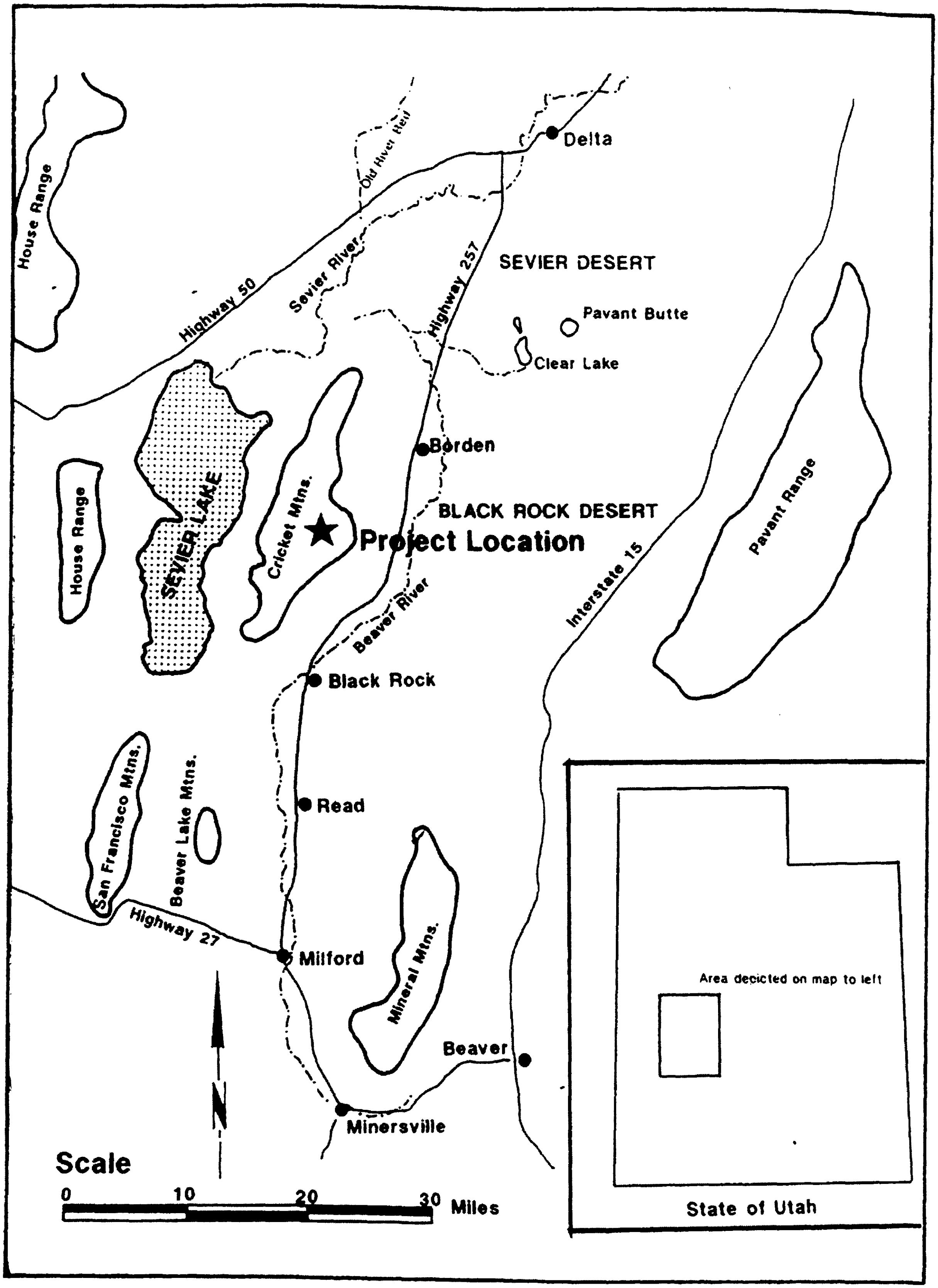

Figure 1. Project Location.

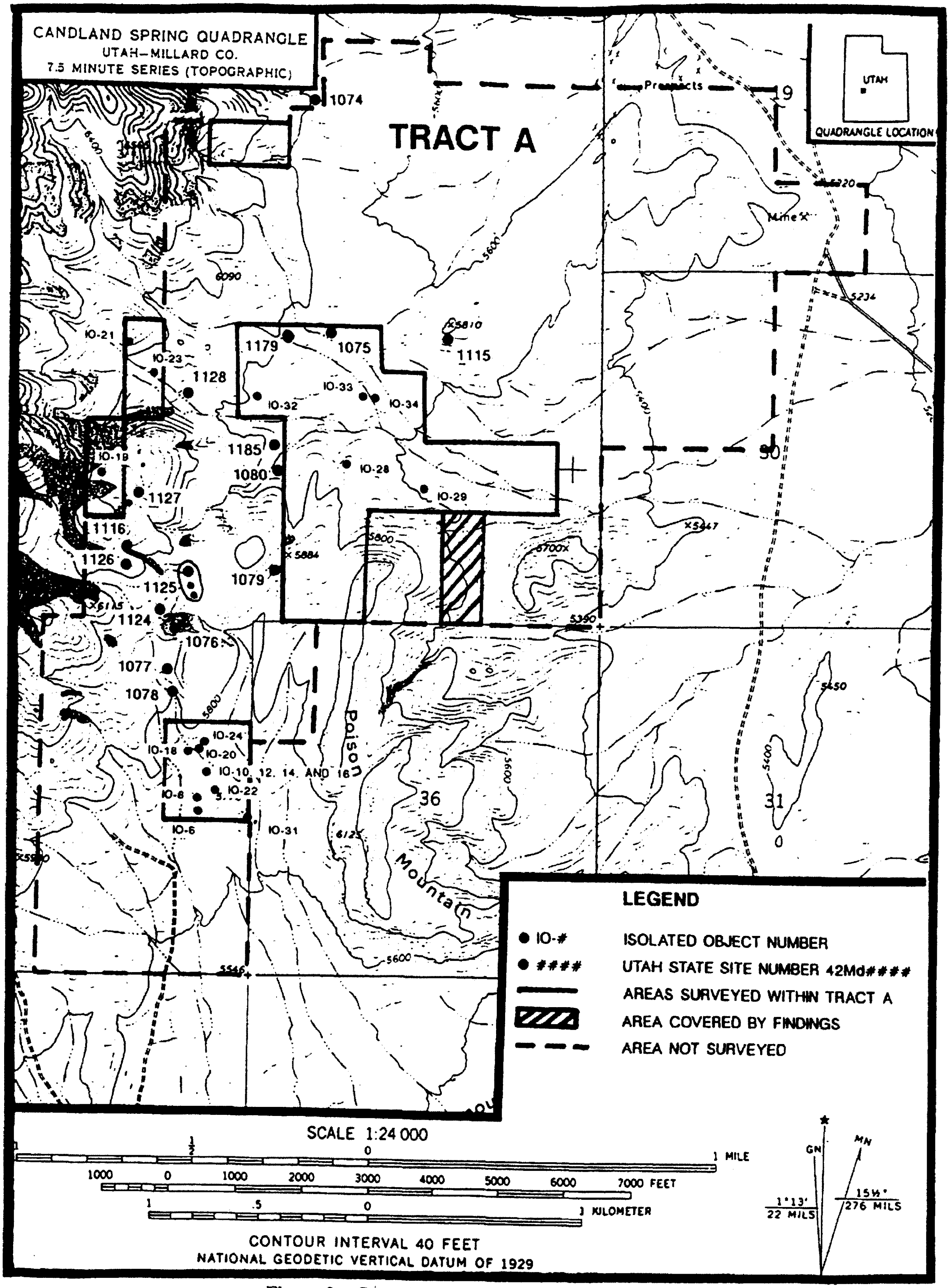

Figure 2. General project location Tract A.

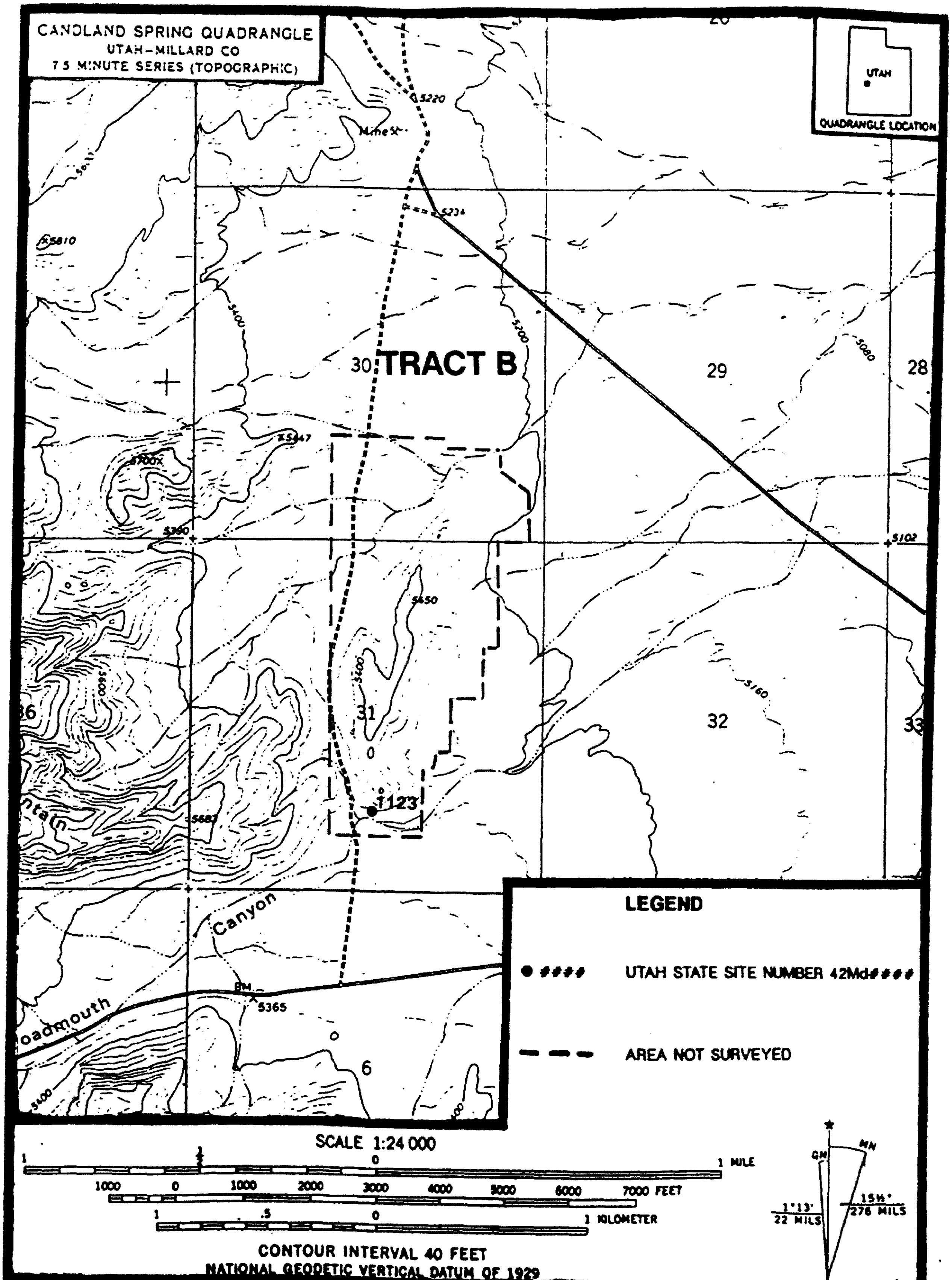

Figure 3. General project location Tract B.

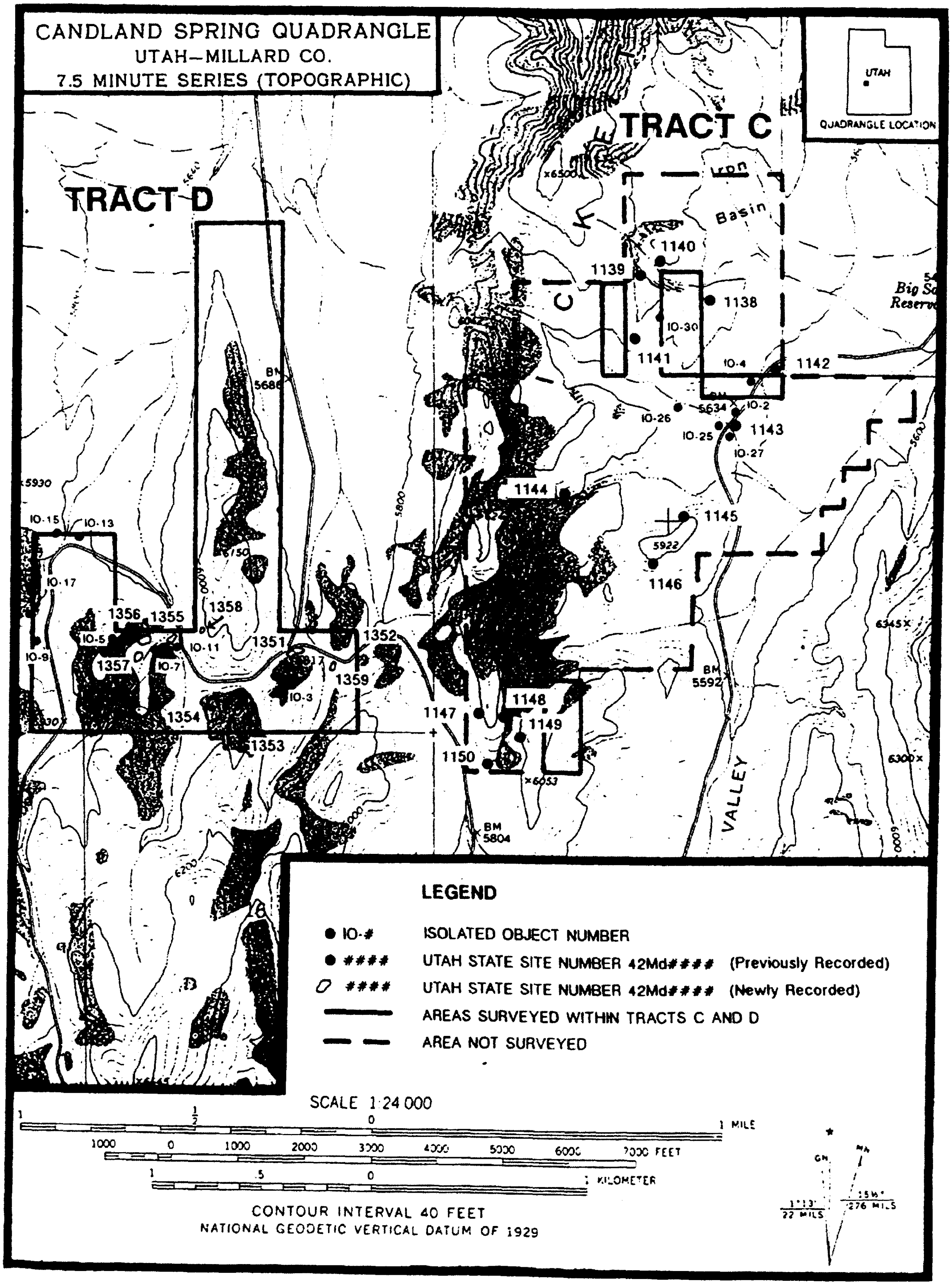

Figure 4. General project location Tracts C and D.

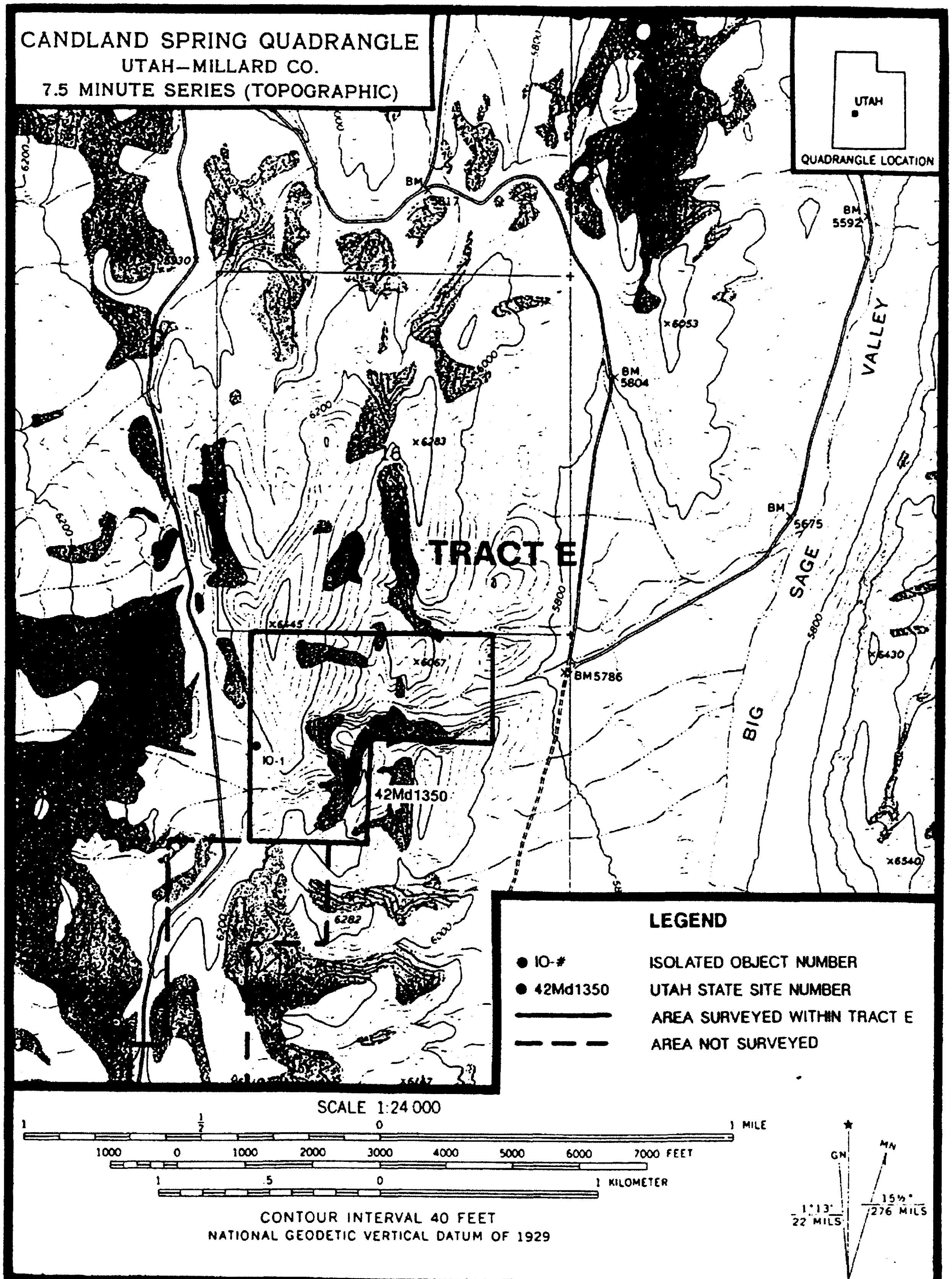

Figure 5. General project location Tract E.

Table 1. Legal Locations of Areas Surveyed for
(Candland Spring, Utah 7.5' Quad) Continental Lime, Inc. (cont.)

Section 35			
Portion	NW	SE	NE
Portion	NE	SE	NE
All	SW	SE	NE
All	SE	SE	NE
N½	NW	NE	SE
N½	NE	NE	SE
<u>Tract C</u>	<u>T22S, R10W</u>		
Section 15			
Portion	NW	NE	NW
Portion	NE	NE	NW
Section 10			
E½	SW	SE	SW
Portion	SE	SE	SW
Portion	NW	SE	SW
Portion	NE	SE	SW
Portion	NW	NE	NE
N½	NE	NE	NE
Section 3			
Portion	SE	NE	SE
Portion	SW	NE	SE
Portion	NE	SE	SW
Portion	NW	SE	SE
Portion	NW	SW	SE
Portion	NE	SW	SE
Portion	NW	SE	SE
Portion	SE	SE	SW
Portion	SW	SW	SE
Portion	SE	SW	SE
Portion	SW	SE	SE
<u>Tract D</u>			
Section 4			
Portion	NW	NE	SW
S½	NE	NE	SW
Portion	NW	NW	SE
E½	SW	NE	SW
All	SE	NE	SW

W½	SW	NW	SE
E½	NW	SE	SW
All	NE	SE	SW
W½	NW	SW	SE
E½	SW	SE	SW
All	SE	SE	SW
W½	SW	SW	SE
Section 9			
E½	NW	NE	NW
All	NE	NE	NW
W½	NW	NW	NE
E½	SW	NE	NW
All	SE	NE	NW
W½	SW	NW	NE
E½	NW	SE	NW
All	NE	SE	NW
W½	NW	SW	NE
Portion	SW	SW	NW
E½	SW	SE	NW
All	SE	SE	NW
W½	SW	SW	NE
W½	NW	NW	SW
E½	NW	NE	SW
All	NE	NE	SW
W½	NW	NW	SE
Portion	SW	NW	SW
Portion	SE	NW	SW
Portion	SW	NE	SW
All	SE	NE	SW
Portion	SW	NW	SE
Portion	SE	NW	SE
Portion	SW	NE	SE
All	NW	SW	SW
All	NE	SW	SW
All	NW	SE	SW
All	NE	SE	SW
All	NE	SW	SE
All	NE	SW	SE
W½	NW	SE	SE
All	SW	SW	SW

Table 1. Legal Locations of Areas Surveyed for (Candland Spring, Utah 7.5' Quad) Continental Lime, Inc. (cont.)

Section 9 (cont.)			
All	SE	SW	SW
All	SW	SE	SW
All	SE	SE	SW
All	SW	SW	SE
All	SE	SW	SE
W½	SW	SE	SE
Section 8			
Portion	SW	SE	NE
S½	SE	SE	NE
Portion	NW	NE	SE
All	NE	NE	SE
Portion	SW	NE	SE
All	SE	NE	SE
Portion	NW	SE	SE
All	NE	SE	SE
Portion	SW	SE	SE
All	SE	SE	SE
Section 21			
Portion	NW	NW	NW
All	NE	NW	NW
All	NW	NE	NW
All	NE	NE	NW

All	NW	NW	NE
All	NE	NW	NE
Portion	NW	NE	NE
Portion	SW	NW	NW
All	SE	NW	NW
All	SW	NE	NW
All	SE	NE	NW
All	SW	NW	NE
All	SE	NW	NE
Portion	SW	NE	NE
Portion	NW	SW	NW
All	NE	SW	NW
All	NW	SE	NW
Portion	NE	SE	NW
N½	NW	SW	NE
N½	NE	SW	NE
Portion	NW	SE	NE
Portion	SW	SW	NW
All	SE	SW	NW
All	SW	SE	NW
W½	SE	SE	NW
Portion	NW	NW	SW
N½	NE	NW	SW
N½	NW	NE	SW
Portion	NE	NE	SW

Table 2. Previously Recorded Sites Reevaluated and/or Flagged by WCRM.

Site No.	Legal Description	UTM Coordinates (Zone 12)	Mine Parcel	Previous Documentation
42Md1080*	NW¼,NW¼,SW¼ Section 25, T 21S, R 10W	432700 mE 4313675 mN	A	Norman, 1993
42Md1116*	NW¼,NE¼,SW¼ Section 26, T 21S, R 10W	331900 mE 4313400 mN	A	BLM Survey 4/14/94
42Md1123*	NW¼,SW¼,SE¼ Section 31, T 21S, R 9W	334900 mE 4311700 mN	B	Norman 1994a
42Md1125*	NW¼,SW¼,SE¼ Section 26, T 21S, R 10W	332160 mE 4313300 mN	A	Norman, 1994a
42Md1126*	NW¼,SW¼,SE¼ Section 26, T 21S, R 10W	331740 mE 4313375 mN	A	Norman, 1994a
42Md1127*	SE¼,NW¼,SE¼ Section 26, T 21S, R 10W	331920 mE 4313580 mN	A	Norman, 1994a
42Md1138**	NW¼,SE¼,SE¼ Section 3, T 22S, R 10W	331440 mE 4310115 mN	C	Norman, 1994b
42Md1139**	SW¼,NW¼,SE¼ Section 3, T22S, R 10W	330100 mE 4310290 mN	C	Norman, 1994b
42Md1140***	SE¼,NW¼,SE¼ Section 3, T 22S, R 10W	330260 mE 4310275 mN	C	Norman, 1994b
42Md1141**	SW¼,SW¼,SE¼ Section 3, T 22S, R 10W	330095 mE 4309980 mN	C	Norman, 1994b
42Md1142**	SE¼,SE¼,SE¼ Section 3, T 22S, R 10W	330725 mE 4309800 mN	C	Norman, 1994b
42Md1143**	Center of NE¼ Section 10, T 22S, R 10W	330200 mE 330500 mE 4309680 mN 4309520 mN	C	Norman, 1994b
42Md1144**	Center of SE ¼ of NW ¼ Section 10, T 22S, R 10W	329720 mE 4309190 mN	C	Norman, 1994b
42Md1145**	SE¼,SW¼,NE¼ Section 10, T 22S, R 10W	330300 mE 4309175 mN	C	Norman, 1994b

Table 2. Previously Recorded Sites Reevaluated and/or Flagged by WCRM (cont.).

Site No.	Legal Description	UTM Coordinates (Zone 12)	Mine Parcel	Previous Documentation
42Md1146**	NE¼,SW¼,SE¼ Section 10, T 22S, R 10W	330180 mE 4309000 mN	C	Norman, 1994b
42Md1147**	SE¼,SW¼,SW¼ Section 10, T 22S, R 10W	329340 mE 4308310 mN	C	Norman, 1994b
42Md1148**	SE¼,SW¼,SW¼ Section 10, T 22S, R 10W	329460 mE 4308220 mN	C	Norman, 1994b
42Md1149**	NW¼,NE¼,NW¼ Section 15, T 22S, R 10W	329460 mE 4308160 mN	C	Norman, 1994b
42Md1150***	NE¼,NW¼,NW¼ Section 15, T 22S, R 10W	329340 mE 4308050 mN	C	Norman, 1994b
42Md1185*	NW¼,NW¼,SW¼ Section 25	432700 mE 4313735 mN	A	Norman, 1995

* The site was only reevaluated
** The site was reevaluated and flagged
*** The site was only flagged

Table 3. Sites Recorded by WCRM.

Site No.	Legal Description	UTM Coordinates (Zone 12)	Mine Parcel	Previous Documentation
42Md1350	SE¼,SE¼,NW¼ Section 21, T 22S, R 10W	328090 mE 430590 mN	E	none
42Md1351	SE¼,SW¼,NW¼ Section 9, T 22S, R 10W	328750 mE 4308640 mN	D	none
42Md1352	NE¼,NW¼,SW¼ Section 9, T 22S, R 10W	328705 mE 4308660 mN	D	none
42Md1353	NE¼,NE¼,NW¼ Section 16, T 22S, R 10W	328230 mE 4308220 mN	D	none
42Md1354	SW¼,SE¼,SW¼ Section 9, T 22S, R 10W	328100 mE 4308330 mN	D	none

Table 3. Sites Recorded by WCRM (cont.).

Site No.	Legal Description	UTM Coordinates (Zone 12)	Mine Parcel	Previous Documentation
42Md1355	SW¼,NE¼,SW¼ Section 9, T 22S, R 10W	327930 mE 4308650 mN	D	none
42Md1356	SE¼,NW¼,SW¼ Section 9, T 22S, R 10W	327800 mE 4308660 mN	D	none
42Md1357	NE¼,SW¼,SW¼ Section 9, T 22S, R 10W	327760 mE 4308590 mN	D	none
42Md1358	SW¼,NE¼,SW¼ Section 9, T 22S, R 10W	328030 mE 4308710 mN	D	none
42Md1359	NE¼,SW¼,SE¼ Section 9, T 22S, R 10W	328730 mE 4308510 mN	D	none

Note: All of these sites were flagged.

Project Description

The Class III inventory was conducted to document the cultural resources present in areas of potential expansion of the Continental Lime mining operation and to allow for exploratory core drilling within Continental Lime Tracts C, D, and E, the areas of proposed expansion. All sites within Continental Lime Tracts C, D, and E, including 13 previously recorded sites in Tract C, were protected by flagging a 100-foot buffer around the site boundary prior to drilling. The flagging was removed once the drilling activity was completed. A total of 16 previously recorded sites within areas of proposed mine expansion in Tracts A, B, and C were reevaluated to aid in determining National Register of Historic Places (NRHP) eligibility at the request of the BLM and Continental Lime, Inc. Two additional sites (42Md1142, 42Md1143) were reevaluated based on observations made during fencing and one site (42Md1140) was reevaluated in error.

Synopsis of Results

During the project, ten new sites and 34 isolated occurrences were recorded. Seven of the ten new sites found during the current survey and 2 of the 19 reevaluated sites are recommended for the NRHP (Table 4). The 14 remaining previously recorded sites were found to be lacking the qualities that would make them eligible for inclusion in the NRHP. Seven of the fourteen lacked evidence of any cultural material or behavior and therefore cannot be considered sites. Out of 30 sites that were encountered during the current undertaking, 7 prehistoric lithic scatters, 3 caves and 1 multicomponent site are considered significant and are recommended eligible for inclusion in the NRHP (see Table 4). Thirteen of the 30 sites did not require additional attention beyond temporary flagging.

Of the ten newly located sites, seven are recommended eligible for inclusion in the NRHP (see Table 4). Three new sites (42Md1351, 1353, and 1359) are recommended as not significant because they lack the qualities that would make them eligible for the NRHP.

Of 19 reevaluated sites only two (42Md1141 and 1080) are considered significant and are recommended eligible for the NRHP (see Table 4). Fifteen of the 17 remaining previously recorded sites (42Md1116, 1123, 1125, 1126, 1127, 1138, 1139, 1140, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, and 1185) were examined by excavating one to three shovel probes to determine potential eligibility. Site 42Md1116 was not relocated and site 42Md1142 was reevaluated without a test probe. These 17 sites were found to be lacking the qualities that would make them eligible for inclusion in the NRHP. Of these, eight of the rockshelters and caves (42Md1127, 1138, 1140, 1144, 1145, 1146, 1147, and 1149) produced no evidence of cultural material, with the exception of burned bones that, if cultural, were transported by packrats and are out of site context. These shelters and caves have no evidence that they are archaeological sites.

Sites 42Md1123, 1125, 1126, 1139, 1142, 1143, 1148 and 1185 are archaeological sites, but are not recommended as eligible. 42Md1123 has buried, but minor, cultural deposits. Site 42Md1116 was not located, as was the case during an earlier visit by mine personnel, BLM, and WCRM. Based on our examination of the area and site sketch maps, we believe that 42Md1116 and 1125 are the same site. 42Md1126 may have eligible deposits, but it has been looted and now lacks integrity. 42Md1139 contained few artifacts and lacked deposition indicating that the site does not contain information sufficient to advance our knowledge of prehistoric lifeways. Based on observations made during flagging, the boundaries of two of the previously recorded sites (42Md1142, 42Md1143) were modified and both sites were re-mapped to more accurately reflect their boundaries. WCRM concurs with the previous evaluation for these two sites of non-eligibility as recommended by ARCON (Norman 1994b).

One site, 42Md1185, contained buried deposits, including historic cans, in two features, either privies or trash pits. Two episodes of site use are apparent; nevertheless, the buried deposits appear to be restricted to the features, and the cultural assemblage in them is limited. It is felt that significant information cannot be recovered from 42Md1185, and that it is not recommended as eligible to the NRHP.

Table 4. Sites Examined During the Cricket Mountain Quarry Expansion Survey.

- New Sites
  - New Sites Recommended Eligible for the NRHP
    - 42Md1350 (cave)
    - 42Md1352 (multicomponent)
    - 42Md1354 (lithic scatter)
    - 42Md1355 (lithic scatter)
    - 42Md1356 (lithic scatter)
    - 42Md1357 (lithic scatter)
    - 42Md1358 (cave)
  - New Sites Recommended Not Eligible for the NRHP
    - 42Md1351 (multicomponent)
    - 42Md1353 (lithic Scatter)
    - 42Md1359 (lithic Scatter)
- Reevaluated Sites
  - Reevaluated Sites Recommended Eligible for the NRHP
    - 42Md1080 (lithic Scatter)
    - 42Md1141 (cave)
  - Reevaluated Sites Recommended Not Eligible for the NRHP
    - 42Md1116 (lithic scatter-not located)
    - 42Md1123 (rock shelter)
    - 42Md1125 (lithic scatter)
    - 42Md1126 (rock shelter)
    - 42Md1139 (lithic scatter)
    - 42Md1142 (historic tin can scatter)
    - 42Md1143 (historic sheep camp)
    - 42Md1148 (lithic scatter)
    - 42Md1185 (seasonal camp)
  - Reevaluated Sites Recommended as Not Cultural
    - 42Md1127 (rock shelter)
    - 42Md1138 (rock shelter)
    - 42Md1144 (rock shelter)
    - 42Md1145 (rock shelter)
    - 42Md1146 (cave)
    - 42Md1147 (rock shelter)
    - 42Md1149 (rock shelter)
  - Sites Flagged Only
    - 42Md1140 (rock shelter tested by error)
    - 42Md1150 (sheep camp)

BACKGROUND

Environmental Setting

The Continental Lime Inc., project area is located in the Basin and Range Province (Fenneman 1928, cited by Simms and Isgreen 1984) in south-central to western Utah. The province contains hundreds of north-south trending isolated fault block mountain ranges. The project area is within and on the flanks of the Cricket Mountains (7039 feet, 2962 m), one such mountain range (see Figure 1). Numerous other ranges encircle the Sevier Desert Basin forming a closed basin within the Great Basin. The project area is adjacent to the Sevier Desert to the northeast and Black Rock Desert to the east. Sevier Lake (4516 feet, 1376 m) is located directly west of the Cricket Mountains.

Vegetation

The project area is located within three vegetational zones as described by Billings (1951, cited by Simms and Isgreen 1984). The alluvial fans and flanks of the Cricket Mountains are predominantly within the sagebrush-grass zone although the shadscale zone extends onto the alluvial fans and drainage bottoms. The mountain tops and slopes fall predominantly within the pinyon-juniper zone.

The shadscale zone is found predominantly to the east of the project area within the Black Rock and Sevier Desert. However, the zone also extends into several areas within the project area. Grasses such as *Oryzopsis hymenoides* (Indian rice grass), *Stipa comata* (needle and thread grass) and non-native *Bromus tectorum* (cheatgrass) are found along the flanks of the mountains within this vegetational zone. Three shrubs dominate this zone including, *Atriplex canescens* (four-wing saltbush), *Sarcobatus vermiculatus* (greasewood), and *Atriplex confertiflora* (shadscale). The sagebrush-grass zone is found throughout the majority of the mine tracts. The zone is characterized by several shrubs including, *Artemisia tridentata* (big sagebrush), *Ephedra* sp. (Mormon tea), *Chrysothamnus* (rabbitbrush) and *Tetradymia* sp. (horsebrush). Grasses include those listed above and *Sporobolis airoides* (drop seed grass), *Hilaria jamesii* (galleta grass), and *Poa* sp. (bluegrass). *Elymus* sp. (wild rye) was observed in several drainage bottoms.

The pinyon-juniper zone is found at slightly higher altitudes within the mine tracts and is dominated by *Juniperus osteosperma* (Utah juniper). *Artemisia tridentata*, *Cowania mexicana* (cliffrose), *Ephedra* sp. and several grasses were observed in association with this zone.

Fauna

Diverse populations of mammals, birds, reptiles, and insects inhabit the Cricket Mountain area. Small animals include pocket gophers, ground squirrels, jack rabbits, cottontails, badgers and porcupines. Larger animals include coyotes, antelope and deer.

Numerous pronghorn antelope were observed inhabiting the low elevations of the shadscale zone to the east of the project area. Mule deer are inhabitants of the sagebrush-grass and pinyon-juniper zone especially during the winter months.

Geology

Faulting in the Basin and Range Province began during Miocene times and continues today. Associated volcanic activity has formed the distinctive topography. Seven basaltic lava fields have been identified in the desert to the east of the project area (Condie and Barsky 1972, cited by Simms and Isgreen 1984). Volcanic activity associated with Pavant Butte (see Figure 1), to the northeast of the project area is believed to have occurred relatively recently, between 16,500 and 14,000 years ago. The Tabernacle lava field appears to be more recent at about 11,000 years ago (Simms and Isgreen 1984:36-37). Several of these nearby lava fields contain numerous outcrops of obsidian which were exploited by the prehistoric inhabitants of the area.

Recently Simms (1984a) reported on trace element analyses conducted on obsidian artifacts from four sites encountered during the Intermountain Power Project Transmission Line (IPP) survey in the Sevier Desert Basin. Artifacts from two Fremont sites, one Archaic site, and one Archaic site with a Fremont component were examined. A proclivity towards exploiting the closest source of obsidian was observed, although the closest source was sometimes in excess of fifty miles away. Simms also observed that none of the obsidian was from sources outside of the immediate area of the basin which he suggests may indicate that mobility was restricted to a limited area.

The surrounding Mountains are predominately sedimentary rock of the Paleozoic era. The limestone outcrops being mined by Continental Lime Inc., are of this era. Other ranges contain volcanic rocks of the Tertiary period and sedimentary deposits of the Pliocene and Pleistocene epochs.

Climate

In general the climate of the Cricket Mountains and Sevier Desert Basin is characterized as semi-arid with widely varying fluctuations in temperature and precipitation from year to year. Rain can be plentiful during April and June due to stationary storms within the Great Basin. The amount of rainfall tends to increase through the summer. Temperatures generally remain warm through the fall but can drop drastically at night. The first freeze usually occurs in late September. Winters can be sunny with stable high pressure and are generally colder at the base of the basin and warmer near the foothills (Houghton 1969; Burnham 1950 cited in Simms and Isgreen 1984).

PREHISTORY AND CHRONOLOGY

The project area is located in Millard County, Utah, in the Eastern Area of the Great Basin, one of six archaeological areas defined by Jennings (1986). The archaeological subareas of the Great Basin are distinguished on the basis of regionally distinctive "artifact inventories and...the variable adaptations made to local environments" (Jennings 1986:114). The boundary between the Eastern and Western subareas is shown by Jennings (1986:Figure 1) running north to south, more-or-less parallel to and approximately 100 km west of the Nevada/Utah state line. The project area is about 180 km east of Jennings' boundary, and, as such, is well within the Eastern Area. The archaeology of the project area should reflect this.

Previous Research

The research most relevant to this project is the data recovery conducted as part of the IPP transmission line project (Simms and Isgreen 1984). The IPP is the transmission line under which you drive as you approach the project area from State Highway 257. During the IPP project, radiocarbon dates in association with diagnostic cultural materials were obtained from sites in the vicinity of the current project that confirm that the Eastern Great Basin cultural chronology is representative of the project area (Simms and Isgreen 1984:389-411).

Danger Cave and other nearby caves and shelters, the subjects of Jennings' (1957) pioneering study, provided the first radiocarbon dates as well as subsistence and paleoenvironmental information for the Great Salt Lake Basin, the large basin which comprises the northwestern portion of the Eastern Great Basin. The assemblages of perishable objects and other cultural materials recovered from Danger Cave have been augmented by a broad range of artifacts recovered from other major cave excavations in Utah, notably Hogup Cave (Aikens 1970) and Sudden Shelter (Jennings et al. 1980). Various additional studies conducted during the past three decades have contributed to the regional database. Sudden Shelter, Acord Lake, Clyde's Cavern, Fish Springs Lake, Scribble Shelter, Smith Creek Caves, Amy's Shelter, and Katchina Cave are located within 100 to 150 km of the project area (Aikens and Madsen 1986:149), and are important to our understanding of the Eastern Area of the Great Basin.

Cultural-Chronological Sequence of the Eastern Area

The sequence established for the Eastern Area is largely based on data from major cave excavations conducted by the Anthropology Department of the University or Utah. Additional studies, most of which were conducted as a part of studies mandated by environmental protection legislation, have provided distributional information (e.g., Lindsay and Sargent 1979; Janetski 1983; Janetski and Holmer 1982, cited by Aikens and Madsen 1986:151; Simms and Isgreen 1984).

A human presence in the vicinity of Danger Cave on the western edge of the Great Salt Lake Desert is established by the recovery of cultural materials and radiocarbon dates centering around 11,000 years B.P. (Jennings 1957). From northwest of the project area, a slightly later date (9,820 ± 60 yrs. B.P.) is now available from the Sunshine Well locality in Long Valley (Beck and Jones, personal communication), where archaeological sites contain abundant early assemblages and fewer, smaller, late assemblages. The sites in the Sunshine Well locality have yielded numerous crescents and stemmed points, including types referred to as Parman, Lind Coulee, and Silver Lake (Bryan 1980). It is not unreasonable to expect that the project area was first visited by humans some time around 11,000 to 10,000 years ago.

Cultural units in the Eastern area chronology do not necessarily correlate with the presence of one or more diagnostic projectile point styles (Aikens and Madsen 1986; Jennings 1986). The shifts from one cultural unit to the next are largely defined on the basis of the wide range of technological and settlement/subsistence data available from the wealth of excavated dry cave deposits in the Eastern Great Basin. In contrast, several projectile point series serve as time-markers for phases in the various Western area chronologies (Thomas 1981, 1982, 1983; Elston 1986). In part, the phases have been defined on the basis of these time-markers. Given the presence of superior data for the Eastern Area, the chronological subdivisions better reflect behavioral and/or adaptive changes between time periods.

Most of the point styles that serve as diagnostics for phases in the Western Great Basin are distributed throughout the Eastern area as well, where they have persisted for a longer time (Holmer 1986). A recent paper explores the earlier appearance of large side-notched and corner-notched points in Northern and Eastern subareas than in the Western Great Basin, suggesting that this may be attributed to mid-Holocene population reduction in the more arid west (Beck 1995), rather than diffusing from east and/or northeast to west (see Hockett 1995).

The prehistoric sequence of cultures in the Eastern Great Basin has been subdivided into a series of temporal periods. These periods, often defined based on data other than projectile point styles, can be described as follows.

The Bonneville Period (ca. 9000 B.C.-7500 B.C.)

A small, dispersed human population was established in the Great Basin by the end of the Pleistocene, perhaps earliest in the Eastern area. This group left large, edge-ground, fluted and/or stemmed points, a suite of steep-edged stone tools, and an occasional ground or pecked stone tool where they worked and lived. The period during which archaeological sites bearing these assemblages were created in the Eastern Great Basin is termed the Archaic Bonneville period (9000-7500 B.C.) by Aikens and Madsen (1986).

Without the diagnostic points or crescents, these earliest assemblages may not always be recognized, although other items in the early tool kit differ somewhat from later equivalent artifact types, predominantly in size and raw material. A preference for basalt, rhyolite, and other relatively coarse-grained silicates was characteristic of the earliest populations, although obsidian, chert, jasper, quartz, agate, and chalcedony were also used for points, crescents, and other objects at the Sunshine Well locality in White Pine County (Hutchinson 1988). Most large, early sites are relatively dispersed lithic scatters along pluvial lakeshores, but sites are known for upland and riverine situations as well. With the exception of the relatively large sites at the Sunshine Well locality, most of the latter are small sites or isolated occurrences of points or crescents (Elston 1982:192; 1986). 42Md743, located north of the project area, produced out-of-context stemmed points that date typologically to this period (Simms 1984b:398).

Except for the size and artifact density in the lithic scatters, archaeologists have not yet been able to differentiate site types. The paucity of well-studied archaeological remains from this earliest period makes it difficult to determine how the subsistence focus may have differed from that of later populations. Aikens and Madsen (1986:154) suggest that the remains from the earliest Bonneville period may be transitional:

> *The dated sites belong to a period when Pleistocene vegetation patterns were giving way to modern distributions, and it may be that human subsistence and settlement was correspondingly somewhat different from patterns established in Holocene times...The Bonneville period may represent a time of transition between terminal Pleistocene Paleo-Indian big-game hunting and post-Pleistocene Desert Archaic foraging for plant foods and smaller game.*

Elston (1986:137-138) suggests more profound differences:

> *Major divisions of western Great Basin prehistory are made on the basis of change in adaptive strategy, the most profound of which separates Pre-Archaic and Archaic...Present evidence suggests that people in Pre-Archaic cultures hunted big game (probably including extinct megafauna), utilized smaller animals, and (by extension) probably consumed easily gathered and processed lacustrine-marsh plant foods, such as cattail shoots, pollen, and green seeds. However, unlike people of Archaic cultures, they did not grind seeds, live on sites long enough to accumulate midden deposits, construct permanent structures, or store resources in facilities visible in the archeological record.*

Elston's (1986) view of the Bonneville period is similar to that of Simms (Simms and Isgreen 1984:11-16). However the debated interpretations of early economic strategies are resolved, later archaeological remains are classified as Archaic throughout the Great Basin, with the exception of the Formative Fremont and Anasazi in the Eastern area and valleys of the Colorado River Basin.

Wendover Period (ca. 7500 BC-4000 BC)

The Desert Archaic subsistence pattern of foraging for plant foods, processing seeds for winter use, and hunting or trapping a variety of both small and large animals characterizes most human occupation of the Great Basin. In the Eastern Great Basin, the Archaic was underway by 7500 B.C. and persisted until A.D. 500. Occupation was characterized by small groups that foraged much of the year as they harvested a wide range of available animals and plant foods, including seeds. They also collected storable surplus for use at more sedentary winter settlements, where two or more of the small summer foraging/collecting groups would coalesce. This general adaptive strategy is recognized archaeologically through artifact assemblages, food remains, and settlement patterns. The archaeological pattern reflects environmental characteristics and so varies both regionally, in response to the environmental variability attributable to latitude and elevation, and temporally, in response to Mid- and Late Holocene climatic cycles.

The Wendover period is estimated to have lasted from the end of the Bonneville period (ca. 7500 B.C.) until 4,000 B.C. Wendover period components are found at the major lake-edge marsh cave sites as well at several upland sites (Aikens and Madsen 1986:155). A diet based on a variety of seeds and other plant foods, supplemented by both large and small game, is known best from food remains in dry cave deposits. These contexts have also yielded coiled baskets used for storage and processing of seeds, the darts and dart-throwers used in big-game hunting, the various nets and snares used to take small game, and the many bone tools used in working the hides to make various containers and articles of clothing. Stone seed-processing and butchering tools and equipment as well as flaked stone dart points, awls, gravers and knives found in well-dated contexts in caves are also used to trace the distribution of Wendover components in open sites. Wendover Period sites (e.g., 42Md743 has a terminal Wendover period date of 5930 ± 220 B.P., but the date may be too young) are known from the project area vicinity (Simms 1984b:398, 401).

Although the area today is quite dry, a study of the contents of packrat middens during the IPP transmission line study indicated the occurrence of two, and perhaps three, periods of increased effective moisture during the Holocene (Madsen 1984:353). Archaeological deposits documented the presence of marshy, wetland environments east of, and along the Cricket Mountain front during much of the Holocene (Simms 1984b:389-411). These wetlands may have been present throughout the Holocene. Although the project area itself may have lacked water during portions of the Holocene, water and water-related resources were probably available within a very few miles.

Early Archaic archaeological assemblages are characterized by the first appearance of seed-processing tools and implements, associated with dart points (including Humboldt and Pinto shouldered), knives, and hammerstones. Later Archaic assemblages are characterized by smaller projectile points and flaked stone tools and largely unshaped, unretouched flake knives or scrapers. Artifacts generally exhibit random flake scar patterns. Most are made from local chert and chalcedony and, less commonly, jasper and obsidian. Milling equipment occurs in some Early Archaic assemblages and becomes more common in later phases. The Formative Fremont replaced the Great Basin Late Archaic in the Utah portion of the Eastern Area and in Eastern Nevada sites.

Black Rock Period: Early — 4000 to 2000 B.C.

Components of the early phase of the Black Rock period are found at a great many more sites than are earlier cultural components. Black Rock period sites are more frequently found in upland locales in contrast to the low use of these locales during the Wendover Period. Aikens and Madsen (1986:158-9) suggest that this settlement pattern shift may be attributable to an interval of increased aridity during the mid-Holocene that led to diminishing lakeside resources. Except for the introduction of new projectile point styles (Elko and Gypsum), which gradually replaced the Humboldt and Pinto types that dominated Wendover components, assemblages remained similar to the Wendover Period.

Black Rock Period: Late — 2000 B.C. to A.D. 500

In the Eastern Area, greater use of upland resources continued as lakeside marshes that had been so productive in the Late Pleistocene and Early Holocene, continued to decrease in size and number. Only lake-edge sites at higher elevations, such as the Fish Springs Caves (Madsen 1982) in western Utah, are known. The improved moisture regime that flooded the lakeside marshes below Danger Cave and Hogup Cave rendering that area less productive enhanced living conditions at higher elevations.

The bow and arrow, with the smaller Rose Spring and Eastgate series points, was introduced during the late phase of the Black Rock Period and by the end of this period had replaced the dart and dart-thrower. Elko series points, formerly used to tip darts, appear to have been used a knives after the full adoption of the bow and arrow (Aikens and Madsen 1986:160).

Transition to Horticulture in the Eastern Area

In the Eastern Area, the time period from the last 400 or 500 years of the Black Rock period until approximately A.D. 800 was characterized by a shift in hunting technology that seems to have modified hunting patterns, the first known use of pinyon nuts and the appearance of small amounts of pottery, often associated with maize. By A.D. 800 settled Fremont cultural horticultural villages were established in the Eastern Area. A small cave at the southern end of the Cricket Mountains (42Md750), contained a Fremont component (Simms 1984b:403).

Changing Adaptive Strategies

Although it has been hypothesized that the earliest Archaic or Pre-Archaic cultures in the Great Basin were based on hunting large game, no clear evidence exists here for the hunting of large Early Holocene herbivores. A broader spectrum of subsistence pursuits, including the exploitation of lakesides and riverine marsh resources seems to be indicated both by site locations and subsistence data both in the Western (Elston 1986; Bryan 1979; 1988) and Eastern subareas (Aikens and Madsen 1986:154; cf., Jennings 1957; Shutler and Shutler 1963; Bryan 1979). The Early Holocene is a period of warming and drying relative to the Pleistocene. On a finer temporal scale, the expression of this warming and drying was through cyclical fluctuations of moister to drier to moister, and warmer to cooler to warmer, but the general trend was towards warming and drying. Relative to the present, the Early Holocente climate was probably cooler and wetter, but also with winter-dominant precipitation (Mehringer 1986; Davis 1982; Grayson 1993). At Smith Creek Cave faunal remains indicate a subsistence pattern based on hunting both large (mountain sheep) and small game. It is interesting to note that no bones of extinct animals were found among the fragmentary remains associated with the early occupation zones, although elsewhere in the deposits camel bones were recovered and camel hair was also identified in a stratum, which could represent human occupation (Bryan 1979).

The Archaic was marked by the addition of milling equipment to the tool kit. This is generally inferred to represent the earliest significant use of dry seeds in the diet. During the Early Archaic period, the population was probably also small, and may have lived in small foraging groups. On the other hand, the presence of sites in a wider range of localities, differentiated at least by the presence or absence of milling equipment and on the basis of size, with larger sites near reliable water sources, may indicate the general Archaic pattern of winter settlements, temporary seasonal campsites, and subsistence activity localities. The transition to a full Archaic pattern in the Eastern subarea seems to have taken place when conditions were both cooler and moister than the present (Aikens and Madsen 1986:150).

Middle Archaic sites are, in general, larger and more frequent throughout the Great Basin. For example, numerous sites in the Eastern subarea were first occupied between 4000 and 2000 B.C. Milling equipment is present in greater numbers and varieties. A population boom and the beginning of intensive occupation of sites such as Newark Cave (Fowler 1968) and Bronco Charlie Cave (Casjens 1974) is apparent. Hunting of mountain sheep and to a lesser extent antelope and deer remains an important subsistence activity, and bison and elk remains are also present in small numbers at Gatecliff Shelter and Newark Cave (Thomas 1983; Fowler 1968). Seasonal campsites were located near water and good resource areas that were at greater than foraging distance from winter settlements. During this period, there is some evidence that resource availability had improved over Early Archaic times (Davis 1982).

The beginning of the Late Archaic seems to coincide with a Late Holocene hot/dry spell in the Central Great Basin. Late Archaic technology there is marked by the introduction of the bow and arrow, indicated by the presence of Rosegate (Rose Spring and Eastgate series), Desert Side-notched, and Cottonwood series points. Milling equipment continues to be important, and distribution of sites indicates largely spring and summer foraging for a wide variety of food resources.

As settled agricultural villages were established in both the Eastern and Southern subareas, some contact with the agricultural Fremont and Anasazi cultures took place in eastern parts of the Western subarea. This contact is indicated by the presence of a few pottery sherds at Newark Cave (Fowler 1968). Late Archaic components also were identified at sites in the western edge of the Great Salt Lake Basin, including Amy's Shelter (Gruhn 1979) and Smith Creek Cave (Bryan 1979). The Fremont village site at Baker, Nevada, and various petroglyph sites, including those in Smith Creek Canyon (Tuohy 1979), are roughly contemporary.

THE HISTORIC PERIOD

Millard County, Utah, can trace its history to the early 19th century. American explorers such as Jedediah Smith and John C. Fremont passed through the region. They found little use for the area except as a route to elsewhere. Equally, the early Mormon settlers did little with the area. However, Brigham Young and other church leaders laid out their plans to settle Utah and west as far as the California-Nevada border. In 1852 Millard County stretched from approximately its modern eastern boundary west to the modern California-Nevada state line. Despite the organization of a county and setting the county seat at Fillmore, little came in the way of actual settlement.

After 1860 people moved into the area to raise livestock and attempt to farm. The area remained isolated and was dependent on wagon transportation until 1879 when the Utah Southern Railroad was extended as far as Frisco, Utah. During the next decade the Mormon church organized a branch in Frisco. The local economy remained primarily ranching-related with mining activity centered at Frisco. During the 20th century dryland farming and ranching became the dominant local activities. However, two forces brought substantial changes to the region. The first was the increased role of the federal government in the role of land steward and manager, which led to an increase in the presence of the federal government in the area. The second was the spread of automobiles and the construction of roads, such as modern Highway 50, that led to the growth of tourism (Federal Writers' Project 1941; Poll et al. 1978).

STUDY OBJECTIVES

The objectives of the Class III Cultural Resource Inventory were to locate, record and evaluate any cultural resources located on BLM land within the project area that would potentially be impacted by exploratory core drilling and mine expansion, to relocate and evaluate 16 previously recorded sites, and to flag a 100 foot buffer zone around all sites threatened by exploratory core drilling. Shovel probes were used in several of the sites identified by WCRM to obtain additional data for the evaluation of significance recommendations for the eligibility of these sites to the NRHP. The objective of the reevaluation of 16 previously recorded sites was to determine if these sites represented cultural resources. Shovel and or trowel probes were used in all of these sites to aid in the reevaluation and determination of eligibility to the NRHP.

The objective of the site flagging was to demarcate the boundaries of all of the sites and establish a buffer zone to prevent any damage occurring to the cultural resources by exploratory core drilling or access to such drilling operations. WCRM archaeologists communicated with the drilling personnel on a daily basis to coordinate the location of the drilling with those areas already surveyed and flagged.

METHODS

A cultural resource literature review was conducted prior to field work in order to identify and evaluate the previously documented historic and prehistoric resources in the project area. The review was conducted by Charles W. Wheeler at the BLM House Range Resource Area office. BLM archaeologist Nancy Shearin was consulted because of her familiarity with local and regional cultural resources. Field work commenced following completion of the literature review and consultation.

Literature Search

Four previous cultural resource investigations were performed in the immediate vicinity of the project area and a total of 33 sites were recorded. Copies were made of the site forms with site and topographic maps and photographs in order to assist the field crews in relocating the sites within the current project area.

In 1993, V. Garth Norman of Archaeological Research Consultants surveyed a total of 279 acres for expansion of the Continental Lime Inc., Cricket Mountain Quarry. Seven open lithic scatters with five sheep camp components were identified. No sites were considered eligible for the NRHP (Norman 1993).

In 1994, V. Garth Norman of Archaeological Research Consultants surveyed an additional 390 acres for expansion of the Cricket Mountain Quarry. Nine sites were identified including, three prehistoric rock shelters, one open lithic scatter, four sheep camps (one with lithic artifacts) and a previously recorded lithic scatter. All five of the prehistoric sites were considered eligible for the NRHP (Norman 1994a).

Also in 1994, V. Garth Norman of Archaeological Research Consultants surveyed an additional 500 acres for expansion of the Cricket Mountain Quarry. Eight prehistoric rock shelters, two open lithic scatters, and three sheep camps were identified. All ten of the prehistoric sites were considered eligible for the NRHP (Norman 1994b).

In 1995, V. Garth Norman of Archaeological Research Consultants surveyed an additional 130 acres for expansion of the Cricket Mountain Quarry. Four historic sites were identified. One site, 42Md1180, should have been designated 42Md1185 (Nancy Shearin to Tom Lennon, letter, 10, July 1996). 42Md1185 was considered eligible for the NRHP (Norman 1995).

Field Methods

The WCRM archaeologists recorded all cultural remains identified as older than 50 years. The BLM in Utah defines a site as "a discrete locus of human activity presumed to be interpretable." Isolates are "not considered sites and Cultural Resource Professional[s'] (CRP) discretion should be employed in plotting, describing, and interpreting such values" (Utah BLM 1984). At the discretion of the archaeologist, areas were designated as sites based on the numbers and types of artifacts, the presence or absence of features, and site integrity. An isolated occurrence (IO) consisted of one or more artifacts that lacked the elements meeting the criteria of a site. The IOs were sketched in the field if appropriate (i.e., tools), and plotted on a U.S.G.S. 7.5' topographic map.

All site information was encoded on standard Intermountain Antiquities Computer System (IMACS) forms (University of Utah and Bureau of Land Management 1992). Temporary site numbers were assigned in the field. These were subsequently replaced by numbers obtained from the Utah Division of State History. At least two photographs were taken of each site. In addition, photographs of diagnostic artifacts were also taken. Additional recording procedures included in-field artifact analyses, subsurface testing, and recording of site characteristics.

Surface Reconnaissance

The survey was conducted with each person spaced 30 m apart and walking parallel zigzag transects. In certain instances the transects were smaller or larger, depending on the topography. For example, very steep (over 30 degrees) slopes were examined at larger intervals, but careful attention was given to topographic and geologic features with the potential to serve as site locations. These features included limestone cliff faces where caves and shelters exist. The surveyor on the outside of each transect flagged a line with biodegradable flagging tape so that the next pass would have a line to work off of and allow for complete coverage of a given area. Artifacts were pin-flagged when encountered to establish site boundaries.

<u>Reevaluation of Previously Recorded Sites</u>. One crew was responsible for reevaluating 16 previously recorded sites in order to clarify NRHP eligibility and to determine if the sites actually represented cultural resources. The first step was relocating the sites, followed by examination of the surface area for cultural remains. Next, a .25 x .25 m shovel test was placed in the sediment to ascertain the presence or absence of subsurface deposits. If the initial probe was inconclusive, one or two additional probes were excavated. All of the probe fill was ¼-or 1/16-inch screened. Artifacts and bones were collected. Excavation of the probes was halted when sterile soil was reached or if cultural remains were uncovered

within the context of stratified deposits in rockshelters or caves. The location of the probes were sketched on the appropriate site maps.

Flagging of 100-foot Buffer Zones. One crew was initially responsible for archaeologically clearing areas leading to and including selected drill holes within mine Tract C. The same crew then flagged a buffer zone 100 feet outside the site boundary. The protection consisted of blue flagging tape placed in trees. Wood lathe was utilized if vegetation was insufficient. The flagging was removed once the drilling was completed. All new sites encountered by WCRM within Tracts D and E were similarly flagged to allow for exploratory core drilling. Access for the drilling equipment to the new sites was coordinated with the drilling crews and monitored by WCRM archaeologists when necessary.

Subsurface Testing. Minimal subsurface probes were excavated at nine of the ten sites identified by WCRM within tracts D and E. These probes were excavated to determine the presence of subsurface remains and to aid in the determination of site significance. The probes were limited to very small areas approximately .25 m x .25 m in size. The fill from each probe was screened through a ¼-inch mesh screen. The location of the probes were plotted on each of the site maps.

Mapping. A permanent site datum (3/8-inch rebar) was placed in a central location of each of the ten site boundaries recorded by WCRM. An aluminum tag was affixed to the datum and the sites' temporary numerical designation, the date of recording, and the company initials (WCRM) were inscribed upon the tag. The datum served as the central mapping station from which a compass and pace procedure was used to generate a site map. Contour lines were added to show the surrounding topography.

In Field Analysis. An attribute analysis of surface artifacts was performed in the field. A 100-percent artifact inventory was attempted with the exception of one site recorded by WCRM (42Md1357) and one reevaluated site 42Md1080. The large size of each of these site assemblages predicated the use of a sample inventory. The artifacts were typologically classified, raw material was recorded, and descriptive observations were made. Tools were measured with calipers and their location was plotted on the site map. Artifact concentrations were also plotted on the map. Historic artifacts were described and measured when possible. Representative illustrations were drawn of some artifacts.

Laboratory Work

No surface collections were made of any of the sites recorded by WCRM personnel. Subsurface artifacts were recovered from probes within four sites recorded by WCRM. These artifacts were collected and a very general analysis was conducted at WCRM. In addition, animal bones recovered from subsurface contexts within reevaluated sites were examined for human modification. These artifacts and non-cultural animal bones will be submitted to the appropriate curation facility.

A bone awl was recovered from the reevaluated site 42Md1141. The artifact was illustrated (see Figure 26) and will be submitted to the appropriate curation facility. In addition, a small rib fragment from 42Md1149 was analyzed by WCRM faunal analyst Cheri Walth. The bone was determined to belong to a sheep to deer sized animal and is not likely to be human.

SURVEY RESULTS

During the survey, 10 sites and 34 isolated occurrences were recorded. Nine of the sites were located in mine Tract D and one was located in mine Tract E (see Table 3). Eighteen isolates were located within mine Tract A, 7 in Tract C, 8 in Tract D and 1 in Tract E.

Isolated Occurrences

During the survey, 34 isolated occurrences were located and are detailed in Table 5. The isolates include single flakes, groups of flakes, and single or grouped historic artifacts. In certain instances several artifacts were counted as a single occurrence because of the similarity and proximity of the artifacts, lack of diagnostic artifacts, absence of spatial integrity of the artifacts, and lack of potential for additional buried material. Five of the isolated artifacts, including two Elko Corner-notched projectile points, are illustrated in Figure 6.

Sites Recorded by WCRM

A total of 10 new sites were recorded by WCRM personnel. Of these, seven sites, are recommended eligible for the NRHP (see Table 4). These include two prehistoric caves, four prehistoric open lithic scatters, and one prehistoric lithic scatter with a historic component.

New Sites Recommended Eligible for the NRHP

Site 42Md1350 (WCRM CL-3). The cave was discovered by WCRM personnel on September 19, 1996, during the Class III cultural resource inventory. The site consists of a medium-sized cave located at the base of an approximately 50 foot vertical, north/south-oriented, limestone escarpment. The cave, has a north and south entrance both of which face west. The entrance is about 120 feet above a large unnamed drainage that connects Big Sage Valley and Filmore Canyon (see Figure 5). Sediment within the site consists of a well-stratified deposit of what appears to be a mixture of eolian silts, exfoliated limestone pieces, and vegetal material.

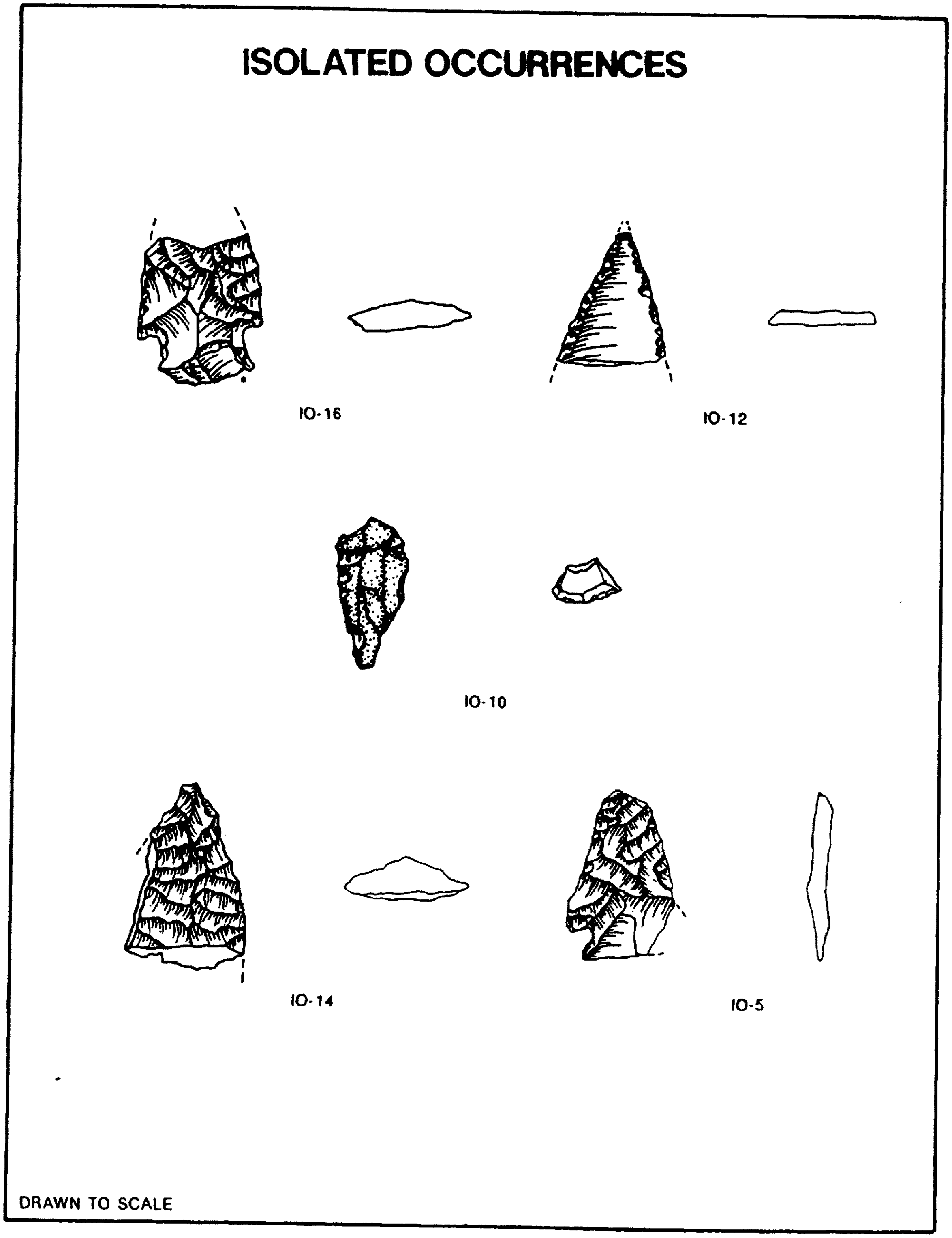

Figure 6. Isolated occurrences.

Table 5. Isolates Recorded by Western Cultural Resource Management.

IO #	Item	Measurement	Mine Parcel	UTMs
1	Utilized obsidian flake.	30 x 37 x 5 mm	E	N4306100 E327640
2	Cast iron metal shaped like a large belt buckle.	15.5 x 14.5 x 0.25 inches	C	N4309630 E330520
3	Obsidian Stage II biface fragment.	23 x 30 x 5 mm	D	N4308440 E328410
4	Red sandstone shaped rock, possible metate fragments.	Cojoined 40.0 x 23.0 x 3.5 cm	C	N4309780 E330600
5	One obsidian Stage II biface fragment One banded mahogany obsidian Elko Corner-notched projectile point with missing tip and ear (Random percussion and pressure flaking noted) (Figure 6)	23 x 19 x 5 mm 30 x 18 x 4 mm	D	N4308660 E327620
6	Obsidian biface fragment.	21 x 23 x 7 mm	A	N4312160 E332220
7	One obsidian tertiary flake; one obsidian tertiary flake; one obsidian secondary flake; one obsidian tertiary flake; one obsidian tertiary flake.	15 x 12 x 1.5 mm 19 x 13 x 4 mm 26 x 16 x 6 mm 16 x 12 x 2 mm 23 x 8 x 6 mm	D	N4308600 E327840
8	Mahogany obsidian secondary flake with a hinge fracture and use wear along 60 percent of the edge; 50 percent cortex.	25 x 31 x 7 mm	A	N4312220 E332200
9	One obsidian tertiary flake; one obsidian tertiary flake; one obsidian secondary flake; one obsidian tertiary flake.	21 x 15 x 2 mm 19 x 8 x 4 mm 21 x 18 x 5 mm 18 x 16 x 3 mm	D	N4308660 E327280
10	Obsidian expedient drill (Figure 6).	12 x 27 x 7 mm	A	N4312320 E332240
11	One obsidian tertiary flake; one obsidian Stage III biface fragment.	15 x 8 x 2 mm 8 x 10 x 2 mm	D	N4308640 E327920
12	Snowflake obsidian uniface fragment (Figure 6).	22 x 20 x 3 mm	A	N4312320 E332240
13	Five gallon rough-cut wooden stave barrel. Thirteen staves, each of which measure 17 x 3 x 1.5 inches and two steel hoops with wire nails and staples are still present. Also two nongalvanized 8-gauge wire constrictors. No markings were observed.	14-inch diameter	D	N4309140 E327500

Table 5. Isolates Recorded by Western Cultural Resource Management (cont.).

IO #	Item	Measurement	Mine Parcel	UTMs
14	Obsidian biface fragment (Figure 6).	21.0 x 33.5 x 7 mm	A	N4312320 E332240
15	One obsidian tertiary flake; one obsidian tertiary flake.	21 x 11 x 2 mm 12 x 8 x 1 mm	D	N4309160 E327400
16	White chert Elko Corner-notched projectile point base. (Figure 6).	22 x 26 x 5 mm	A	N4312320 E332240
17	One obsidian uniface scraper; one obsidian tertiary flake; one obsidian secondary flake; one obsidian tertiary flake; one obsidian tertiary flake; one obsidian tertiary flake.	27 x 26 x 8 mm 21 x 12 x 1 mm 31 x 20 x 10 mm 16 x 21 x 5 mm 35 x 18 x 4 mm 5 x 6 x 2 mm	D	N4309950 E327285
18	Obsidian tertiary thinning flake.	17 x 19 x 1 mm	A	N4312420 E332180
19	Obsidian Stage III biface fragment.	18 x 16 x 6 mm	A	N4313710 E331720
20	Obsidian utilized tertiary flake.	37 x 14 x 5 mm	A	N4312420 E3332205
21	Obsidian Stage III biface fragment.	28 x 16 x 3.5 mm	A	N4314270 E331830
22	Obsidian biface fragment	17 x 29 x 5 mm	A	N4312240 E332280
23	One obsidian tertiary flake; one obsidian secondary flake.	13 x 16 x 3 mm 10 x 12 x 2 mm	A	N4314130 E331980
24	One obsidian retouched flake; one obsidian secondary flake; one obsidian shatter; one obsidian tertiary flake; one obsidian tertiary flake; one obsidian tertiary flake.	24 x 21 x 13 mm 23 x 28 x 5 mm 29 x 29 x 18 mm 21 x 17 x 5.5 mm 17 x 20 x 5.3 mm 17 x 16 x 3.2 mm	A	N4312440 E332225
25	Horseshoe; front shoe with four rectangular nail holes in the crease on each side and St. Croix Forge embossed along the top.	Not recorded	C	N4309560 E330460
26	Two hole-in-top cans; one unidentified can; one "church key" opened can; 3/4" metal strip; one 5.25" squat coffee can.	Not recorded	C	N4309660 E330260
27	One white GMC hubcap; one unidentifiable can; one 3/4" cable partially buried, but estimated at 6 ft long.	Not recorded	C	N4309530 E330500

Table 5. Isolates Recorded by Western Cultural Resource Management (cont.).

IO #	Item	Measurement	Mine Parcel	UTMs
28	One obsidian tertiary flake.	16 x 12 x 3 mm	A	N4313720 E332900
29	One evaporated milk can - match stick filler solder dot top; one piece of obsidian shatter.	Not measurable 36 x 11 x 24 mm	A	N4313720 E333240
30	One hole-in-top can with matchstick filler hole.	Not measurable	C	N4310100 E330180
31	One log cabin tine with screw top; one squat coffee can with key wind strip opening; one Karo pry-up lid; one sardine can; one seasoning can; one tobacco can; two evaporated milk cans with matchstick solder dot tops.	Not measurable one pound size 4 inch diameter not measured not measured not measured One at 2 15/16" x 4 6/16" (1915-1930) and one at 2 15/16" x 3 14/16" (1917-1929).	C	N4312100 E332470
32	One obsidian tertiary flake	16 x 11 x 3 mm	A	N4314020 E332480
33	Two-hand, unifacially ground mano, red siltstone with quartz crystal inclusions.	195 x 85 x 63 mm	A	N4314020 E332990
34	One obsidian primary flake	37 x 33 x 13 mm	A	N4314020 E333005

The cave's southern and northern entrances are apparently connected, but the connecting portion is completely filled with sediment (Figures 7 and 8). The northern entrance is roughly circular and measures 1.7 m wide by 1.6 m high. The southern entrance is located 15 m south of the northern entrance and is roughly circular, measuring 1.7 m wide by 1.9 m wide. Both entrances are located about two meters above the point at which the limestone escarpment meets the talus slope. The talus slope has an approximate angle of 28 degrees and an aspect of 285 degrees. The roughly circular cave appears to be a solution cavity with fairly smooth walls. At the north entrance, a smoothed area along the northern wall could be the result of animal activity or human modification. The cave offers about 19 m of overhead protection from dripline to dripline including the connecting area that is filled with sediment.

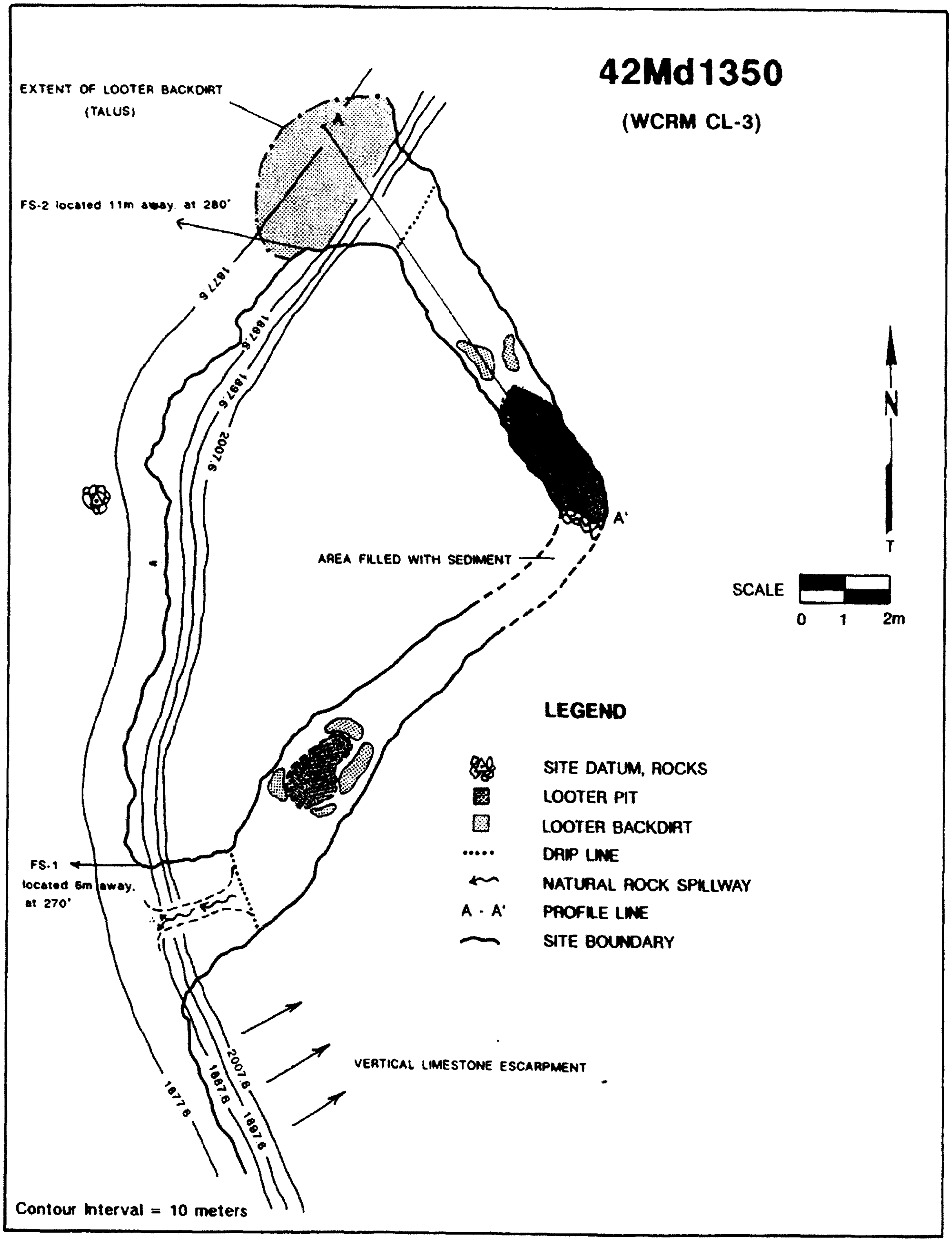

Figure 7. 42Md1350 site map.

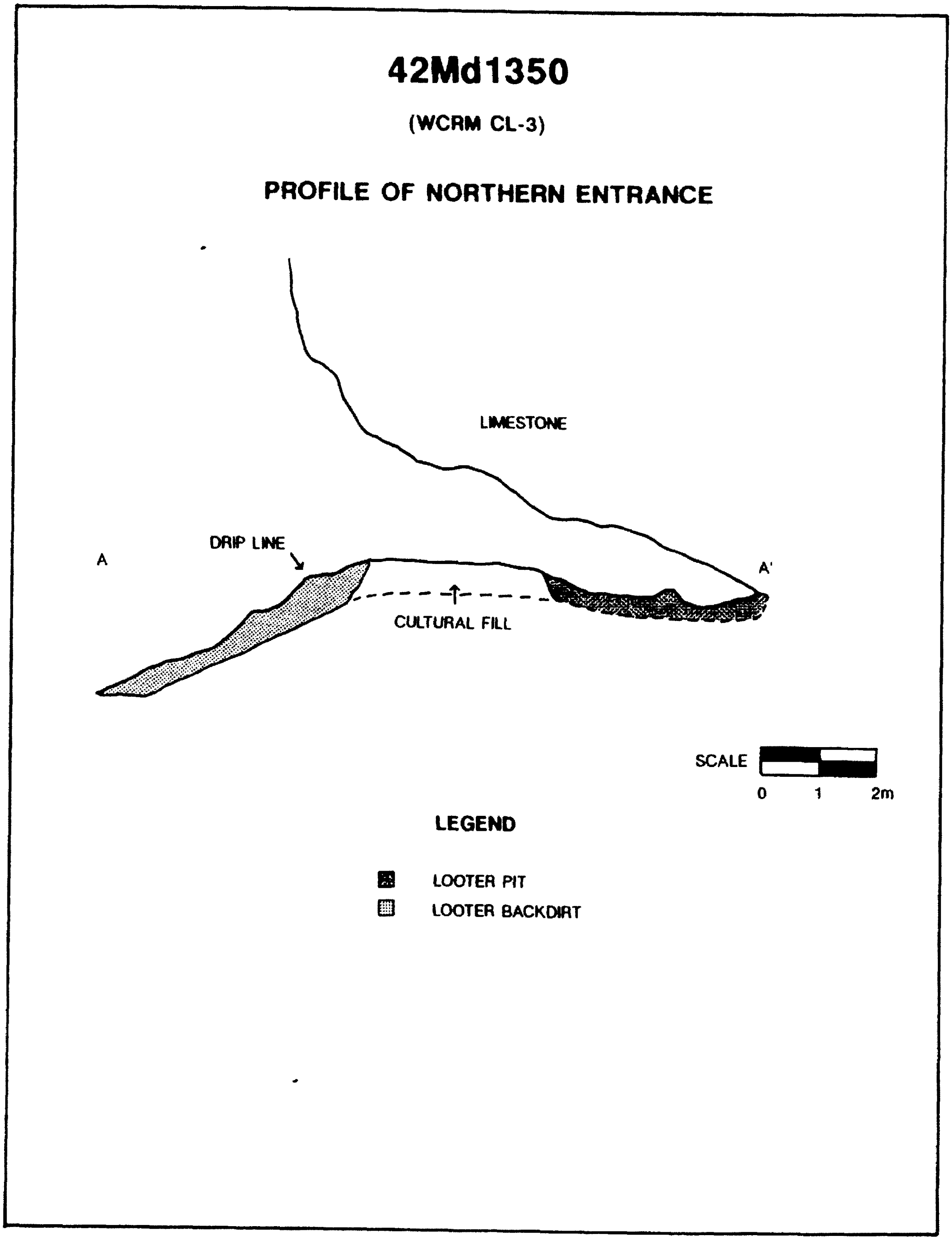

Figure 8. 42Md1350 profile of northern entrance.

Cultural material was observed on the surface, including burned bone fragments, chunks of charcoal, worked bone, an obsidian retouched/utilized flake, and an obsidian Stage III biface fragment. Both obsidian tools are located on the talus in front of the cave openings.

Both the northern and southern entrances have been subjected to recent looting. Two plastic buckets (2.5 gallons and 5 gallons) and a shovel were discovered in the northern entrance. Other evidence of looting includes a sawed-off portion of a shovel handle, a beer can, and various cigarette butts located at the base of the escarpment and on the talus slope. In addition, two looter holes were located in the floor at the entrance. A 3.5 x 1.0 x 0.6 m deep area was excavated from the rear portion of the shelter to the northern entrance. The sediment from the looter holes has apparently been dumped directly in front of the northern entrance. A 2.0 x 1.0 x 0.30 m deep area was disturbed in the front portion of the southern entrance. This sediment is present around the periphery of the excavated area and a small amount is located in front of the entrance.

WCRM contacted the BLM House Range Resource Area in Fillmore the day after discovery. On September 20, 1996 an investigation ensued, with BLM, Continental Lime, and WCRM participating. The BLM collected evidence from the site. BLM Archaeologist Nancy Shearin collected a partially fossilized large calcaneus from the looter's spoils at the northern entrance, and a worked bone tool from the southern entrance.

The stratigraphy of the northern entrance was documented from the surface of the cave and the looter hole. The upper stratum (Stratum I) of the cave consists of fine brown silt loam with numerous inclusions of packrat feces and plant material dominated by juniper needles. Stratum I extends from the surface down 10 cm. A recent packrat nest containing predominately juniper needles is located in the rear portion of the northern entrance. Ashy gray sediment is intermixed with the brown silt loam in places. An area along the northern wall contains a concentration of ash and fire-cracked rock, which are probably looters' spoils. Approximately one half of the surface area of the northern entrance appears to be impacted by looting. Cultural materials observed on the surface of the northern entrance include nuggets of charcoal and fragments of large to small burned bone, some of which appear to be partially mineralized. Several medium-to large-sized burned and partially mineralized bones have been stacked against the southern wall of the cave directly above the looted area. No lithic artifacts, ceramics, textiles or basketry, or other perishable remains were observed on the surface.

Stratum II (ca. 10 to 20 cm) consists of a layer of limestone roof fall in ashy brown silt loam: Stratum III (ca. 20 to 40 cm) consists of light brown soft, loose, silt loam with few inclusions of cave rock and plant material. Stratum IV (ca. 40 to 60 cm) consists of a distinctive reddish orange, soft, loose, silt loam with few inclusions of roof fall.

The looter's hole in the northern entrance does not reach the bottom of the deposits. Several blocks of a weakly developed, cemented, calcium carbonate horizon were observed on the surface in the front of the cave. One face of the cemented layer exhibits numerous inclusions of burned packrat feces and plant material that were likely brought up from underlying deposits during the looting activity. This horizon was not visible in the profile face of the looter hole indicating that it originated from the base of the looter hole. The cemented nature of the deposit indicates some antiquity, as does the partially mineralized nature of the bone.

At the southern entrance, stratigraphic observations are from a 30 cm deep looter's hole. The looter hole did not reach the bottom of the deposit. Stratum I consists of up to 10 cm of ashy gray, well-sorted, soft, loose, eolian silt loam with numerous inclusions of packrat feces and vegetal material dominated by juniper needles. Several distinct burned areas are present along the western wall of the cave. Some charcoal and small to large fragments of burned bone that were displaced by looter activity are now present on the surface. A bone tool was collected from the surface by BLM archaeologist Nancy Shearin. Stratum II (20 to 30 cm) consists of soft, loose, brown silt loam with inclusions of roof fall.

Numerous pieces of a weakly cemented, calcium carbonate matrix are located in the looter's spoils. This could represent Stratum III and is probably related to a similar layer found at the northern entrance. A face of one of the larger blocks of sediment was burned and could reflect a burned living surface or at least another stratigraphic level. The enclosed vegetal materials are sufficient for radiocarbon dating.

In addition, a large portion of the cave north of the looter hole contains undisturbed deposits. The presence of burned bones, charcoal, and a worked bone tool, all of which were from looters' spoils, demonstrate that the disturbed area contained cultural materials. Based on the exposed profile and looters' spoils, there is a high probability that the undisturbed portions of the cave contain buried intact cultural materials.

In summary, the cave appears to contain well-defined stratigraphic layers. Finer stratigraphic divisions may be present, but poor lighting precluded a better view of the stratigraphy. The looting activity has impacted portions of the upper layers of stratigraphy but indications are that about 75 percent of the deposits are not affected, including the sediments that fill the area between the two entrances. Sediment is probably over one meter deep in this area. The partially mineralized bone and cemented nature of one of the layers hints at the possibility of terminal Pleistocene paleontological deposits as well as very old archaeological deposits being present in the cave. The cave, which has very good potential to yield well-stratified archaeological and paleontological remains, is recommended eligible for inclusion in the NRHP.

Site 42Md1352 (WCRM CL-9). The site, which consists of a prehistoric lithic scatter, a tin can scatter, and two hearths (Figure 9), is located on the flat top of a ridge or small knoll covered with residual red silty loam, exposed bedrock, and a heavy cover of angular pieces of limestone (see Figure 4). Vegetation is comprised of juniper trees with an understory of sagebrush and grasses with an occasional prickly pear. The majority of the artifacts are

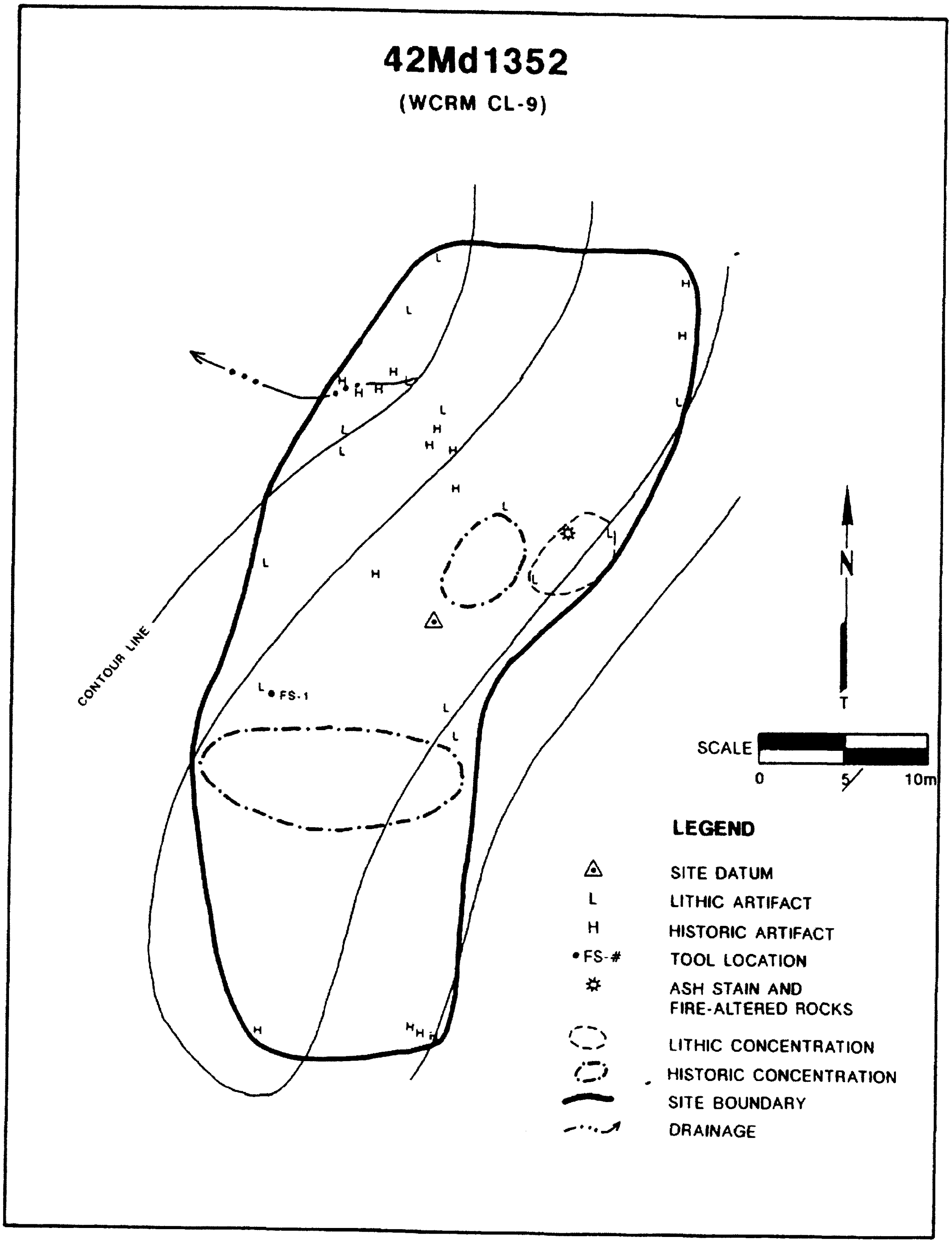

Figure 9. 42Md1352 site map.

found on top of the north-south trending knoll, but additional artifacts are also present on the northwest side of the knoll.

One of the hearths appears to have been used fairly recently; the other is probably prehistoric. A trowel was inserted into the fill of the probable prehistoric hearth and it revealed about 6 cm of ashy soil with small pieces of charcoal. A sufficient amount of material appears to be present to provide a radiocarbon date and a flotation sample. The prehistoric artifacts consist largely of obsidian flakes including 3 primary flakes, 4 secondary flakes, 17 tertiary flakes (6 of which are retouch or biface thinning flakes), 7 pieces of shatter, and 2 indeterminate flakes. Use wear was noted on four of the flakes. The material is dominated by opaque obsidian, but mahogany obsidian was also present. In addition, a gray-green chert Stage III biface fragment that exhibits excellent workmanship was noted.

The historic component of the site includes a hearth that contains chunks of charcoal, but no artifacts, and appears to have been used recently (in the last few years). Also present are at least 23 tin cans, many of them evaporated milk cans with matchstick openings. Two of the cans have "Punch Here" embossed on the top, which dates the cans to 1935-1945 (University of Utah et al. 1992:471-9). The tops have small knife slit openings. Tobacco tins and lids, a squat one pound coffee can and lid, a Ball-type canning lid, and an unidentified metal pry lid were noted. Clear glass is present in two locations, but appears to be part of a single episode of breakage. An exterior fragment of a screw-top neck of a thick bottle is part of the glass assemblage. One wire hoop made by twisting the ends of an 1/8-inch thick piece of wire is present. The distorted hoop measures 19.5 x 14 inches.

Approximately 60 m north of the site a piece of historic ceramic dinnerware was noted, supporting the interpretation that at one time this was a sheep herder camp. A cairn on a juniper stump was found within the site boundary, but the cairn did not contain a claim marker or other material or information.

The multicomponent nature of the site indicates that this was a preferred locale for at least temporary habitation through time. The more recent use appears to have been limited to hunting or camping activity. Earlier use may have been as a sheep herding camp site. The earliest use, as indicated by the chert biface and quantity of obsidian manufacturing or refining flakes, suggests a prehistoric use. Radiocarbon analysis of material collected from the hearth may substantiate a prehistoric date for site occupation. Based on the artifacts and the presence of a datable hearth, this site is recommended eligible for inclusion in the NRHP.

Site 42Md1354 (WCRM CL-13). The site is a 135 m north/south by 80 m east/west lithic scatter (Figure 10) located on a wide,, gently sloping, limestone bench west of a north/south-oriented limestone ridgeline (see Figure 4). Juniper, sagebrush, and Mormon tea are the most common vegetation. Sediment within the site consists of brown silt loam with numerous inclusions of marble-sized pieces of angular limestone. The sediment appears to be predominately residual and the site has been moderately impacted by sheetwash erosion. A 100 percent lithic tally was conducted and 20 tools and 75 pieces of debitage were counted. The debitage is dominated by opaque black obsidian tertiary flakes. Tools include

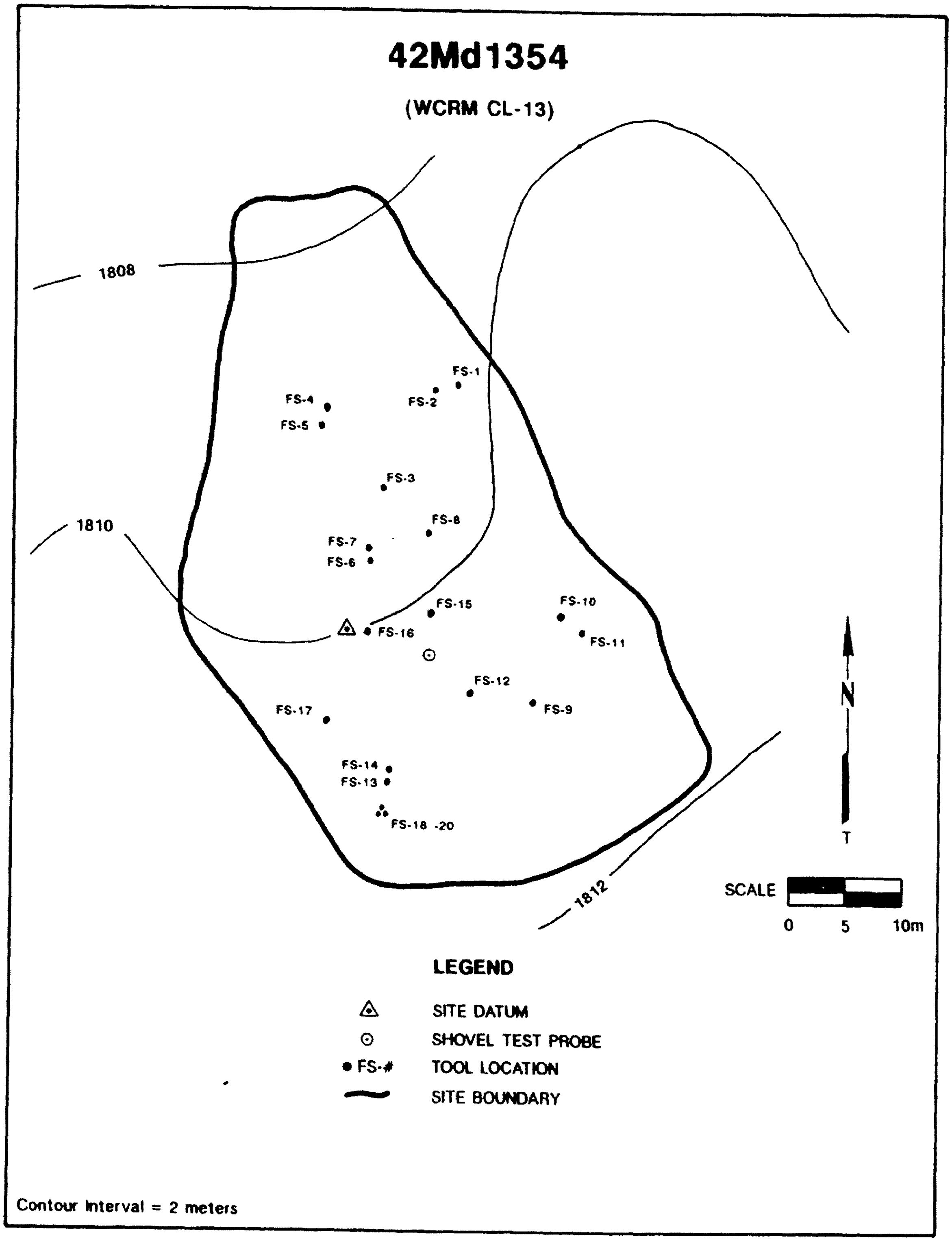

Figure 10. 42Md1354 site map.

13 retouched and/or utilized flakes, 3 Elko Corner-notched points (Figure 11), 1 indeterminate projectile point base, and 2 biface fragments. The Elko Corner-notched projectile points are diagnostic to the Wendover or Black Rock phase (ca. 7500 B.C. to A.D. 500) of the Archaic period in this region of the Great Basin. One unifacial sandstone slab metate with sparse pecking and grinding was also noted. Neither features nor distinct artifact concentrations are present.

One 25 x 25 x 32 cm shovel probe was excavated and revealed approximately 10 cm of a poorly developed A horizon directly above a carbonate-rich C horizon. Bedrock was reached at a depth of 32 cm. One obsidian tertiary flake was recovered from the uppermost portion of the probe. No evidence was noted for stratified subsurface deposits. The site appears to have functioned as a limited activity locality with tools and debitage indicating that resource procurement and/or processing occurred in the area. The subsurface probe suggests that sparse subsurface deposition could be present in areas of the site not directly above bedrock; however, the possibility of well-stratified deposits is minimal. Nevertheless, the type and size of the assemblage implies the site has the potential to provide information concerning prehistoric lithic technology. Analyzing the obsidian to determine its source can provide information regarding trade, exchange or patterns of seasonal transhumance. The site has the potential to advance our knowledge of prehistoric lifeways in this part of the Great Basin and is recommended eligible for the NRHP.

Site 42Md1355 (WCRM CL-15). This 50 m north/south by 75 m east/west lithic scatter (Figure 12) is located on the gentle slope of a small southwest/northeast-oriented ridge line. The site is flanked by a drainage on the northwest and by the Filmore Canyon road on the northeast (see Figure 4). Juniper and sagebrush are the most common vegetation. The sediment on the small ridge is residual brown silt loam with numerous inclusions of small, angular, marble-sized pieces of limestone. Sheetwash erosion has minimally impacted the site.

A 100 percent lithic tally was conducted and 15 lithic tools and 115 pieces of debitage were counted. The entire assemblage is obsidian, mostly an opaque black, although semi-translucent, banded, snowflake, and mahogany types are also present. The debitage consists of 1 primary flake, 7 secondary flakes, 77 tertiary flakes, 18 minute retouch and/or biface reduction flakes, 6 indeterminate flakes, and 6 pieces of shatter. Tools consist of 10 retouched/utilized obsidian flakes, a lateral edge of a Stage I biface, a distal end of a Stage III biface, one Pinto Shouldered projectile point (Figure 13), one Elko Corner-notched projectile point base (Figure 13), and one multi-directional exhausted core. The assemblage indicates an emphasis on the final stages of tool production, refurbishing, or both, but the presence of the core indicates that some initial stages of reduction also occurred. No distinct artifact concentrations or features are present.

Two 25 x 25 x 30 cm test probes were excavated and neither probe exposed subsurface cultural deposits. The upper brown silt loam contains more gravel than the underlying carbonate-rich brown silt loam. The site appears to be predominantly a surface

42Md1354

(WCRM CL-13)

FS-12

FS-13

FS-18

DRAWN TO SCALE

Figure 11. 42Md1354 projectile points.

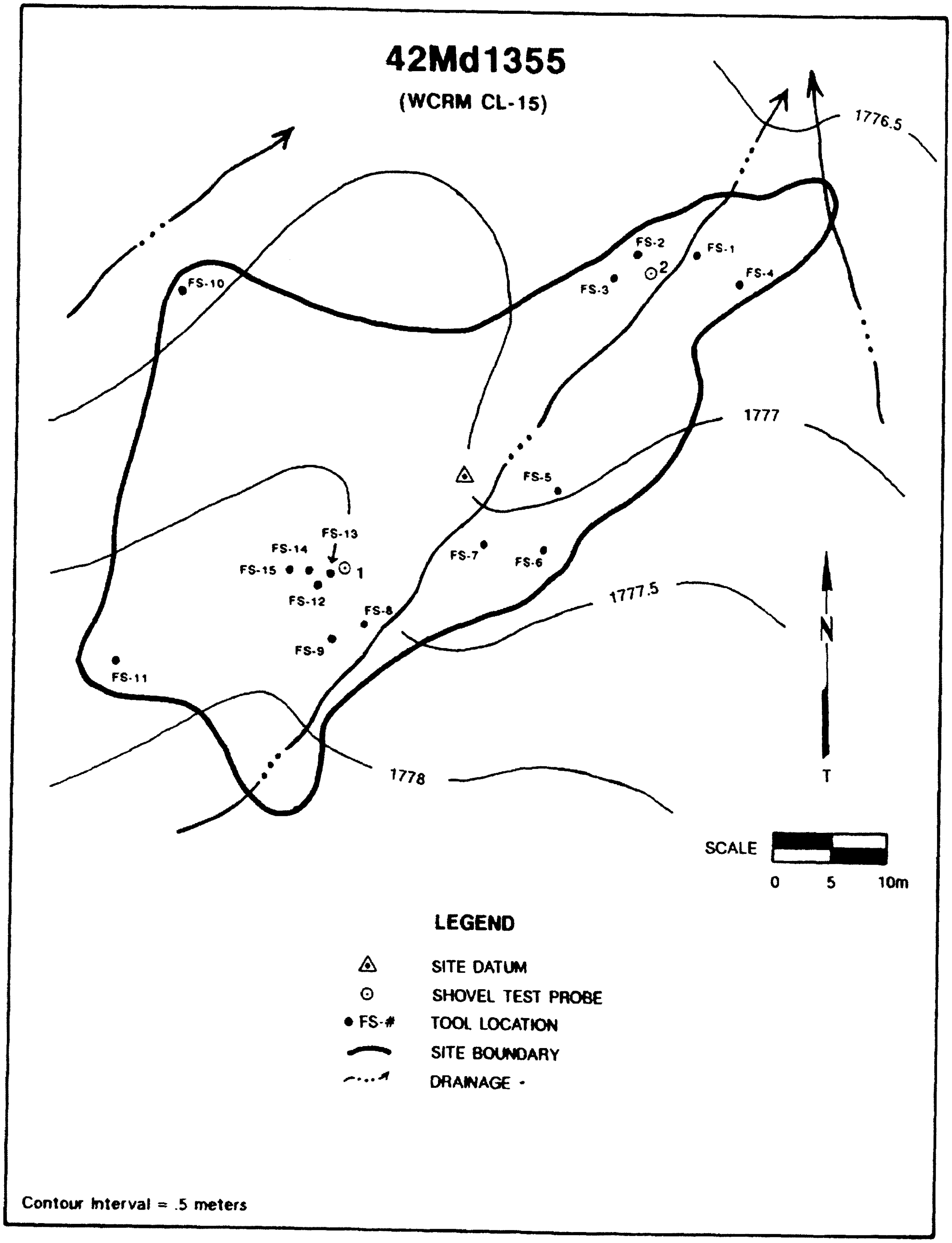

Figure 12. 42Md1355 site map.

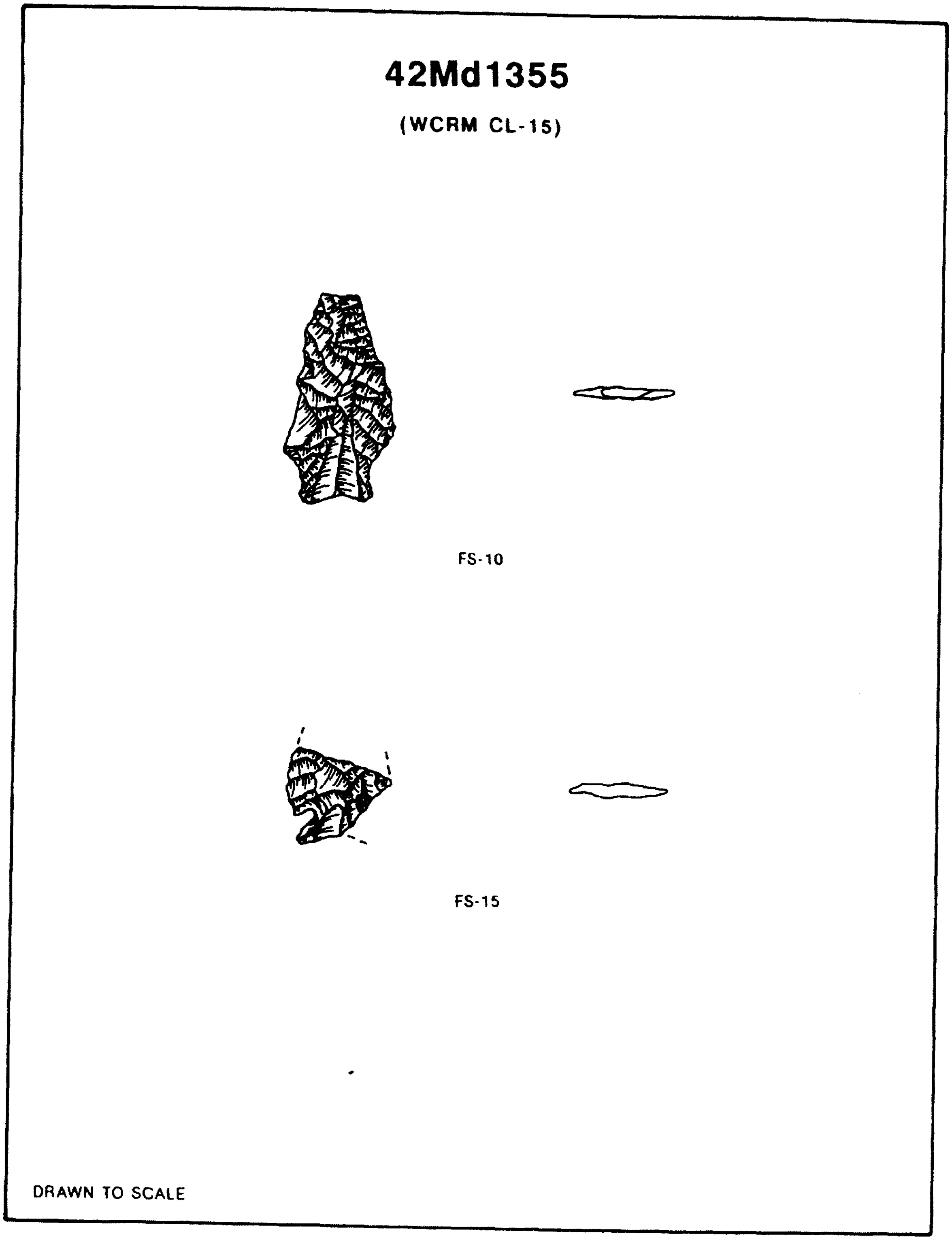

Figure 13. 42Md1355 projectile points.

manifestation. Although there is a slight possibility for some deposition, it is unlikely that stratified cultural deposits are present within the predominately residual sediment.

The site appears to have functioned as a limited activity locality. The tools and debitage indicate that resource procurement or processing or both occurred in the area. The Elko Corner-notched point base is diagnostic of the Wendover through Black Rock phase (ca. 7500 B.C. to A.D. 500) of the Archaic period in this region of the Great Basin. The Pinto Shouldered projectile point, however, is diagnostic of the early Archaic in the eastern Great Basin. The size and nature of the assemblage indicates that the site has the potential to provide additional information concerning prehistoric lithic technology. The source of the obsidian, through trace element analysis, can be identified, which will provide information regarding prehistoric trade, exchange or patterns of seasonal transhumance. Information about lithic technology and obsidian sources will advance our knowledge of prehistoric lifeways in this area of the Great Basin. The site is recommended eligible for inclusion in the NRHP.

Site 42Md1356 (WCRM CL-17). This lithic scatter is a 42 m north/south by 67 m east/west site (Figure 14) located on the slope and base of a distinct red southwest/northeast-oriented ridge (see Figure 4). The site, which is directly north of a small drainage capped with approximately 20 cm of alluvial brown silt loam, has been moderately impacted by sheetwash erosion. The sediment on the ridge is a residual reddish-brown silt loam with over 80 percent marble-sized pieces of limestone and small pieces of tabular sandstone. Juniper and sagebrush are the most common vegetation.

A 100 percent lithic tally of the entire site was conducted. Sixteen lithic tools and 145 pieces of debitage were counted. The debitage is predominantly obsidian tertiary flakes, although primary and secondary flakes are also present. Tools include 11 retouched/utilized flakes, 3 biface fragments, and 2 obsidian cores. No temporally diagnostic artifacts were noted.

Two large, distinct lithic concentrations are present (see Figure 14). Concentration A is on the western side of the site and contains 35 pieces of obsidian debitage and 7 lithic tools. Concentration B is at the eastern edge of the site and is composed of 79 pieces of obsidian debitage, 1 jasper secondary flake, and 8 lithic tools. The general site scatter contains about 30 obsidian flakes (mostly tertiary) and 1 lithic tool.

With the exception of the jasper flake, the raw material is exclusively obsidian. A black opaque variety is most prevalent; however, semi-translucent, snowflake, banded, and mahogany obsidian are also present.

Two 25 x 25 x 40 cm test probes were excavated. Test probe one was placed in the alluvial sediment below the ridge slope in the southeast corner of the site. The probe uncovered no cultural material. A 10 to 20 cm cap of alluvial brown silt loam with few pebbles overlies a brown silt loam with a higher percentage of gravel. Test probe two was placed in the center of Concentration A. Three obsidian tertiary flakes were recovered in the upper 10 cm of the test probe. All 40 cm of sediment consists of gravel laden brown

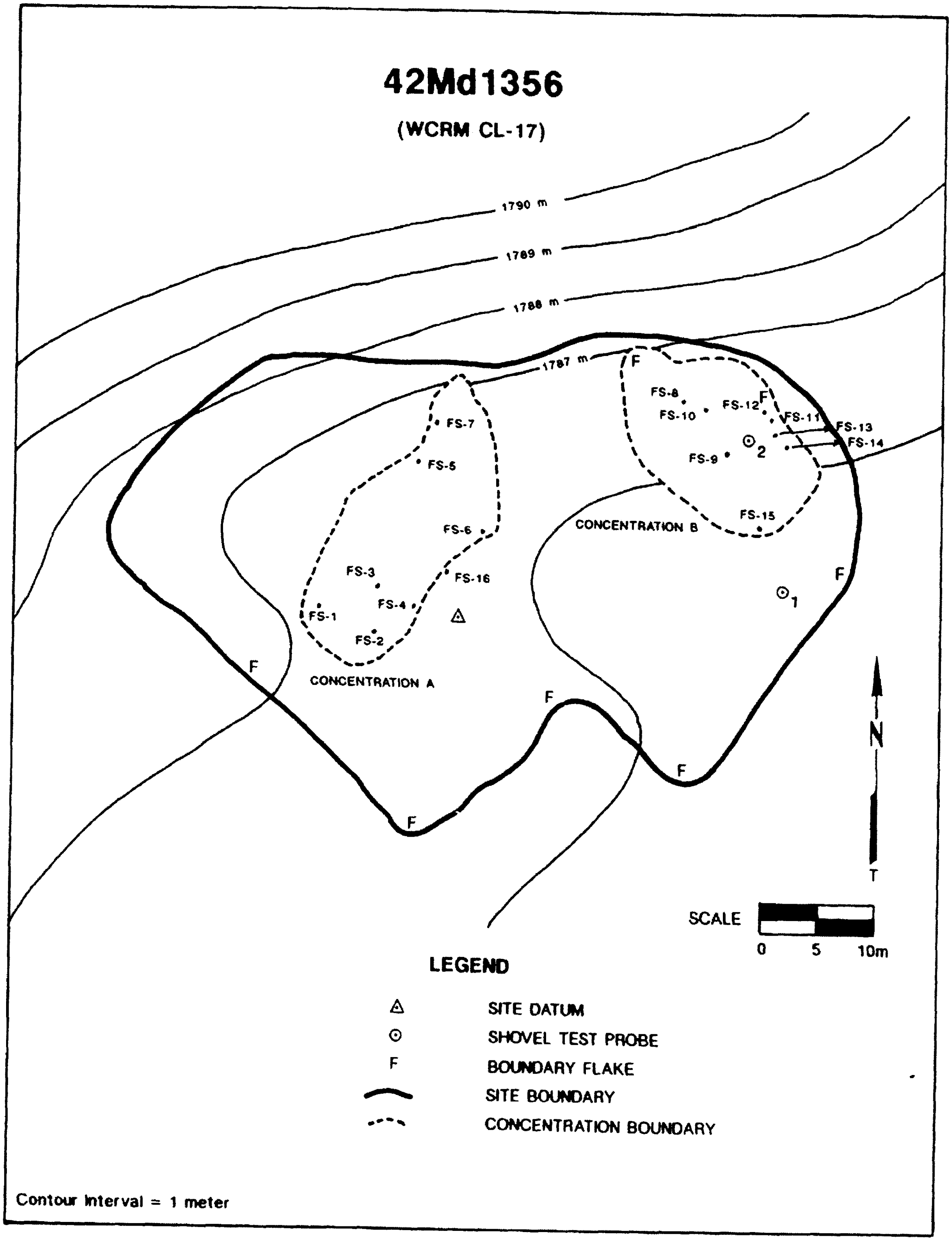

Figure 14. 42Md1356 site map.

silt loam. The probes indicate a slight potential for buried cultural remains; however, the residual nature of the sediment on the hill slope and the shallow amount of alluvium at the base of the ridge indicate a very low probability for stratified deposits.

The site appears to have functioned as a limited activity locality where resource procurement, processing, or both occurred. The concentrations indicate that lithic reduction and/or tool production was conducted in specific areas. Small obsidian cores, and 7 primary and 17 secondary flakes suggest that initial stages of reduction occurred. The large number of tertiary flakes shows that tool production and/or refurbishing was ongoing.

In portions of the site, subsurface artifacts may be located deep enough to allow for obsidian hydration analysis. The size and nature of the assemblage indicates that the site has the potential to provide additional information concerning prehistoric lithic technology. The source of the obsidian, through trace element analysis, can be identified, which will provide information regarding prehistoric trade, exchange or patterns of seasonal transhumance. Information about lithic technology and obsidian sources will advance our knowledge of prehistoric lifeways in this area of the Great Basin. The site is recommended eligible for the NRHP.

Site 42Md1357 (WCRM CL-19). The site is a 40 m north/south by 30 m east/west lithic scatter (Figure 15) situated on a very small ridge, extending east from a larger, north/south-oriented limestone ridge (see Figure 4). The site is directly north of a medium-sized drainage and slightly above an area with alluvial deposition and a very small drainage directly north. The site has been minimally impacted by sheetwash erosion. Juniper and sagebrush are the most common vegetation. Sediment is predominantly residual on the small ridge and a thin cap of alluvial sediments exist in the northern portion of the site. The residual sediment consists of reddish brown silt loam with numerous inclusions of angular, marble-sized pieces of limestone and small tabular pieces of sandstone.

The site consists of a general artifact scatter and two distinct lithic concentrations (A and B) (see Figure 15). Observed lithic raw material at the site is exclusively obsidian. The majority of artifacts are an opaque to semi-translucent black, but snowflake, mahogany, and banded obsidian are also present. The general scatter, which was completely counted, contains 45 flakes and 3 lithic tools. A 1 m x 2 m sample area was tallied in Concentration A. The sample unit contains 58 pieces of debitage and 2 lithic tools. An additional 125 pieces of debitage were estimated for the remainder of the concentration. Concentration A contains exclusively obsidian; the majority of artifacts are opaque to semi-translucent tertiary and minute retouch flakes. The concentration appears to reflect final stages of tool production. A reworked obsidian projectile point was located in concentration A (Figure 16). All of Concentration B was tallied, and 18 pieces of debitage and 3 lithic tools were counted. The artifacts, which are also exclusively obsidian, are predominantly tertiary and minute retouch flakes, suggesting final stages of tool production and refurbishing. One Elko Corner-notched projectile point is present on the surface of the site (see Figure 16). This point style is diagnostic to the Wendover through Black Rock phase (ca. 7500 B.C. to A.D. 500) of the Archaic period in this area of the Great Basin.

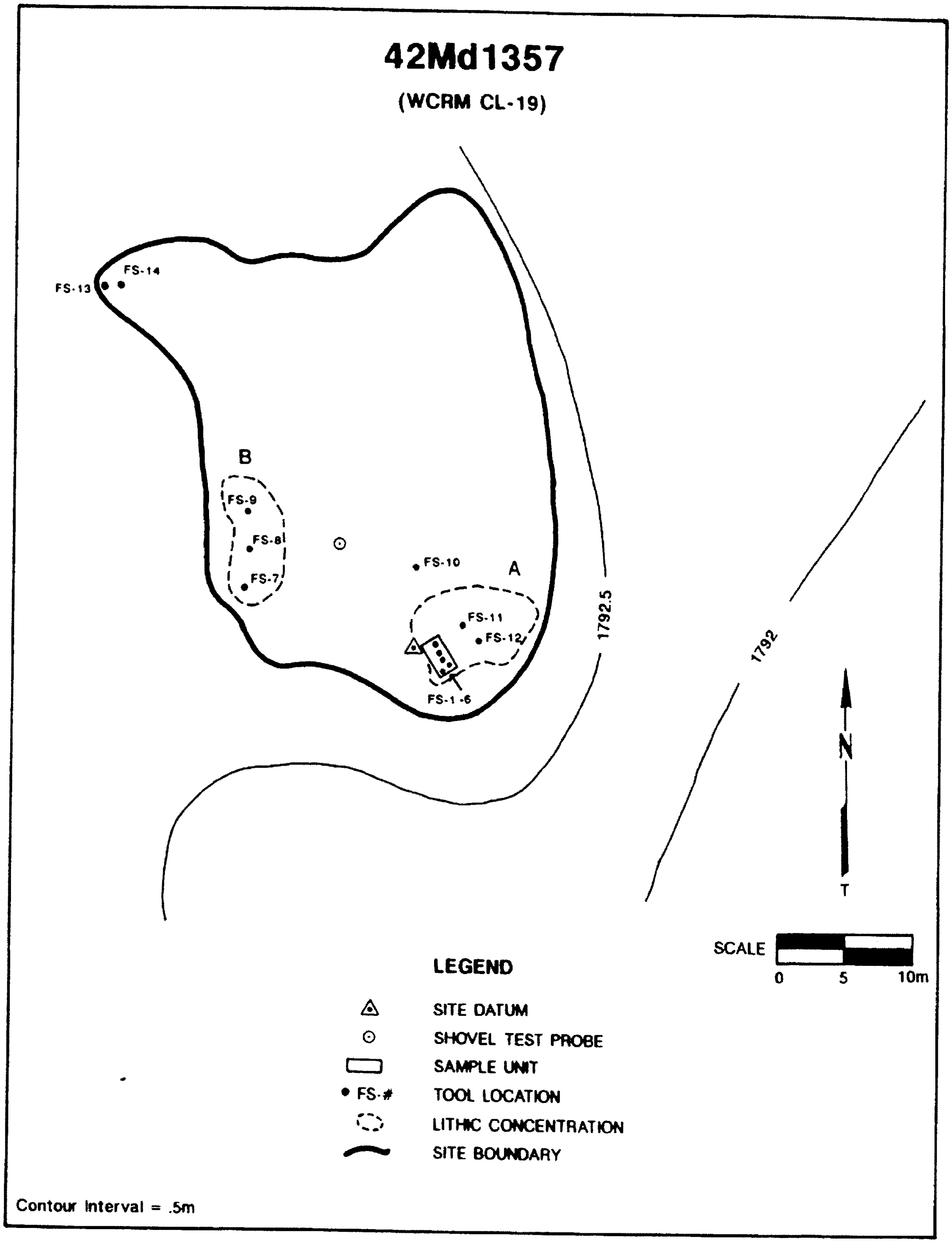

Figure 15. 42Md1357 site map.

42Md1357

(WCRM CL-19)

FS-12

FS-13

DRAWN TO SCALE

Figure 16. 42Md1357 projectile points.

A 25 x 25 x 20 cm shovel probe was excavated in a level area in the central portion of the site. One obsidian tertiary flake was recovered in the upper centimeters of the probe. Limestone bedrock was reached at a depth of 20 cm. No indications were present to suggest that stratified subsurface deposits exist.

The site appears to have functioned as a limited activity locality where resource procurement and/or processing occurred. The concentrations indicate that lithic reduction or tool production or both were conducted in specific areas. The several obsidian primary flakes and minute retouch flakes suggest that small obsidian nodules were being reduced, but the primary focus appears to have been tool production/refurbishing. The sediments are shallow and predominately residual, although a thin (<20 cm) alluvial cap is present in the northern portion of the site. The subsurface probe indicates that very slight deposition may be present in areas of the site. The thin alluvial sediment at the northern portion of the site may contain buried deposits; however, the possibility of well-stratified deposits is very minimal. In still untested areas of the site it is possible that subsurface artifacts may be located deep enough to allow for obsidian hydration analysis. The size and nature of the assemblage indicates that the site has the potential to provide additional information concerning prehistoric lithic technology. The source of the obsidian, through trace element analysis, can be identified, which will provide information regarding prehistoric trade, exchange or patterns of seasonal transhumance. Information about lithic technology and obsidian sources will advance our knowledge of prehistoric lifeways in this area of the Great Basin. The site is recommended eligible for inclusion in the NRHP.

Site 42Md1358 (WCRM CL-21). This site consists of a small cave located on the west-facing slope of a north/south-trending limestone ridge (see Figure 4). The cave is located at the base of a 10 m long limestone escarpment that runs along the crest of the ridge. The entrance to the cave measures 1.5 m wide x 1.6 m high and the cave offers about 4.5 m of overhead protection (Figures 17 and 18). The interior space is roughly circular with a diameter of 1 m. A talus slope of approximately 25 degrees is in front of the cave. A packrat midden is located at the back of the cave and the floor surface is covered with packrat feces. Charcoal fragments, burned bone, and a small piece of cut wood comprise the cultural material found on the surface of the cave.

Two adjacent 35 x 25 x 40 cm shovel probes were placed in the center of the cave, approximately 1.78 m from the dripline. The test probe uncovered a white chert, bifacially worked, unilaterally flaked, secondary flake (Figure 19). The flake was recovered from an approximate depth of 20 cm. In addition, several burned and unburned packrat- and rabbit-sized bones were recovered from the fill.

Four layers of stratigraphy are apparent in the profile of the probe and all of the layers exhibited some degree of packrat intrusions. Other areas of the cave probably retain their integrity. The approximate upper 10 cm of fill consist of loose packrat feces and various plant materials. The underlying 10 to 20 cm consist of soft gray silt loam. This layer is directly above 20 to 25 cm of loose packrat feces and plant material. Brown silt

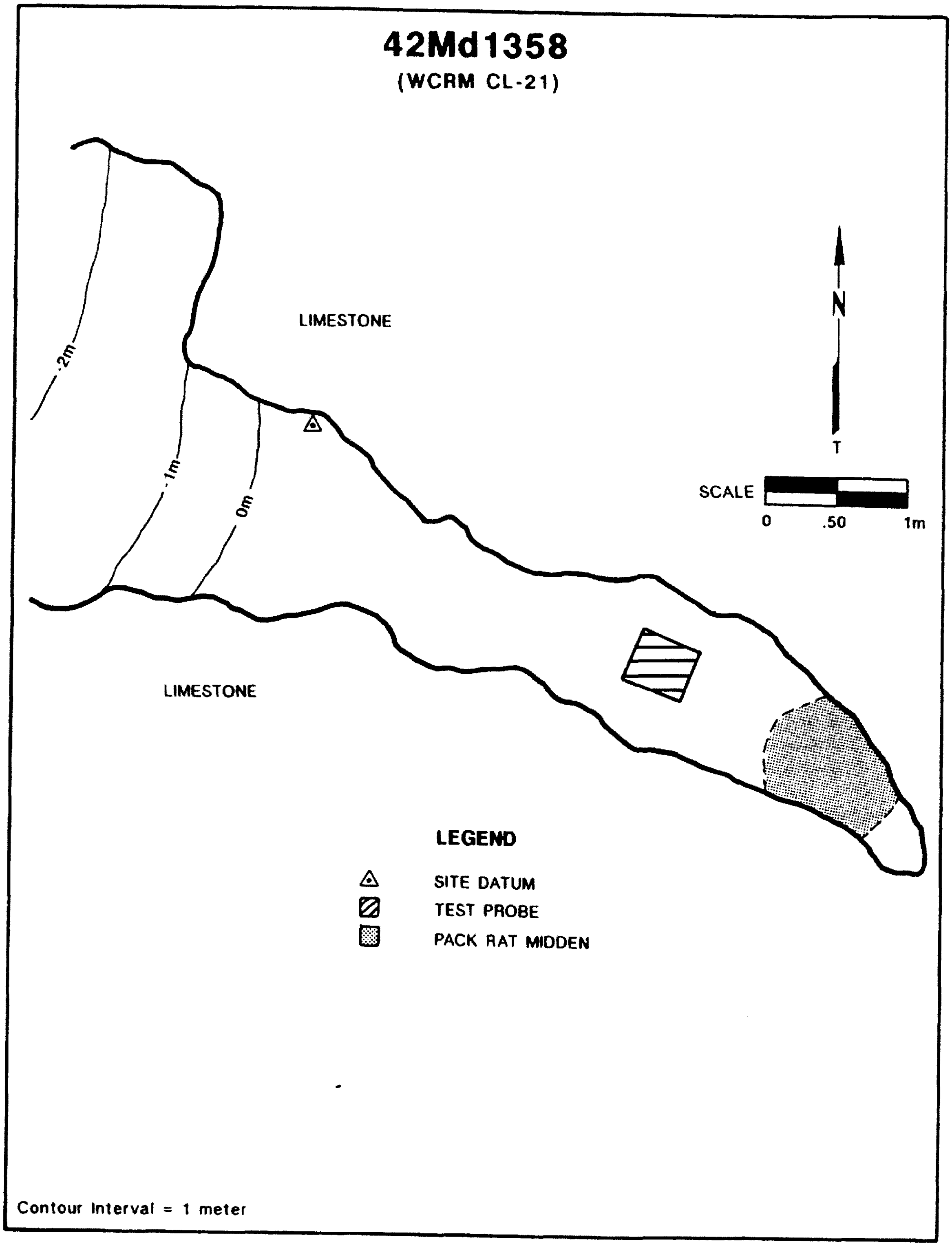

Figure 17. 42Md1358 site map.

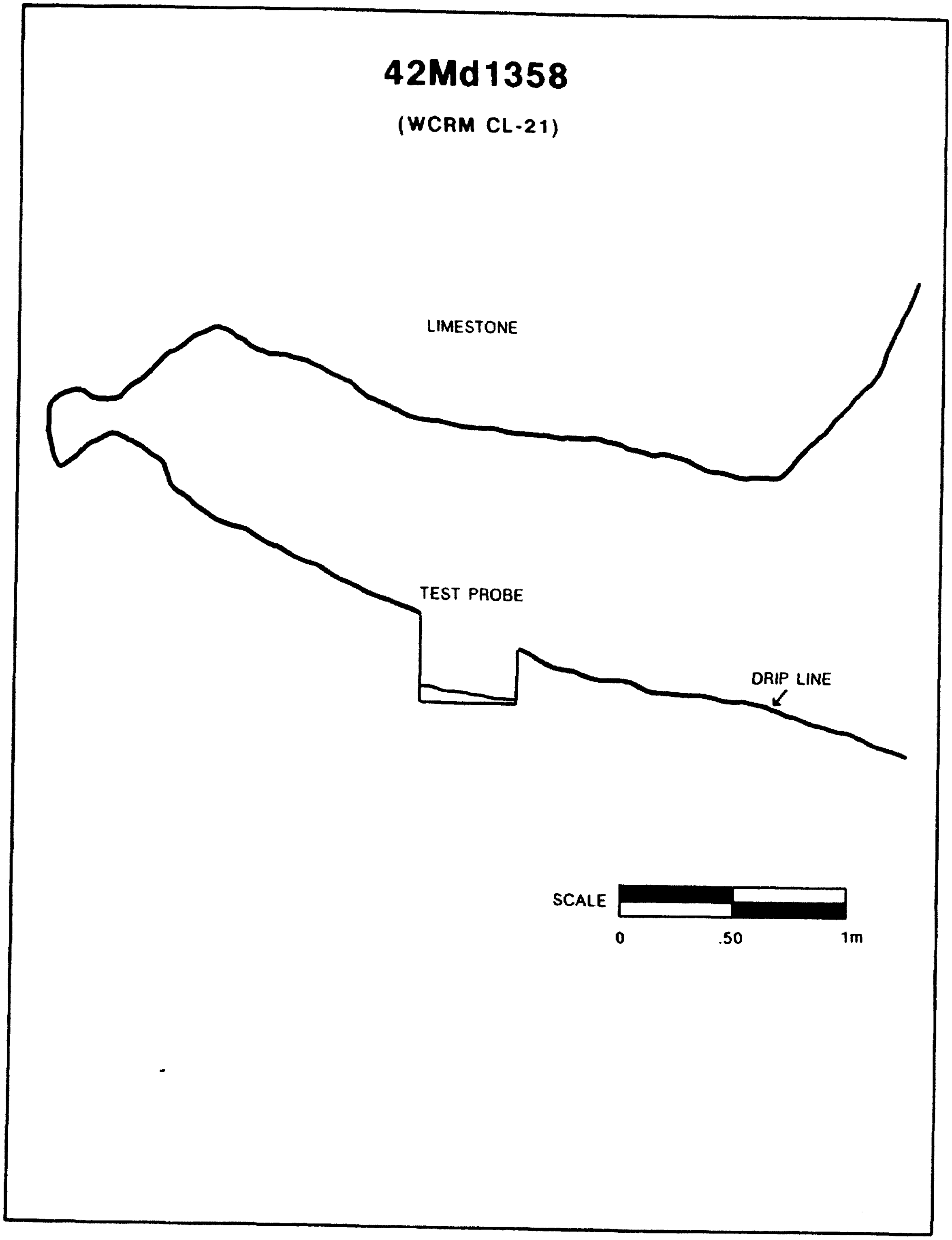

Figure 18. 42Md1358 profile.

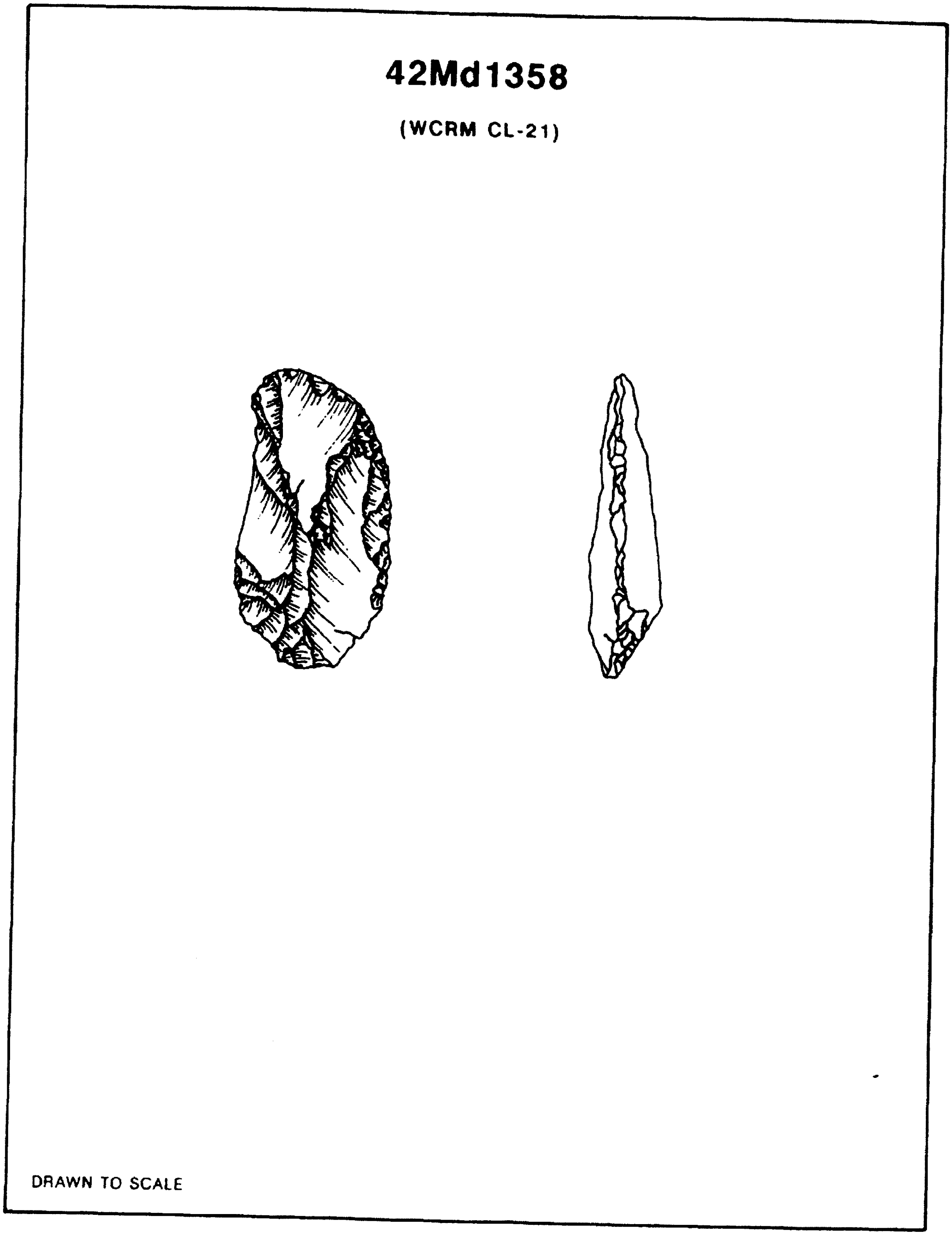

Figure 19. 42Md1358 biface.

loam with fist-sized inclusions of limestone is present from 25 to 40 cm below the surface. Packrat activity is the only obvious subsurface disturbance in the cave. No features are present on the surface or in the probe hole.

The test probe indicated the presence of buried, stratified and preserved cultural deposits; therefore, the site has the potential to advance our knowledge of prehistoric lifeways in this part of the Great Basin. The site is recommended eligible for inclusion in the NRHP.

Sites Recorded by WCRM Recommended Not Eligible for the NRHP

A total of 3 sites recorded by WCRM personnel are not recommended for eligibility to the NRHP. These sites are all located within mine Tract D.

Site 42Md1351 (WCRM CL-7). The site is a 17 m north/south by 90 m east/west prehistoric lithic scatter and historic trash scatter (Figure 20) located along the north side and base of a north/south-trending limestone ridge (see Figure 4). Juniper, sagebrush, snakeweed, and bunch grasses comprise the vegetation. Residual sediment at the site consists of brown silt loam with numerous inclusions of marble-sized pieces of angular limestone. The site has been moderately impacted by sheetwash erosion.

A 100 percent artifact tally was completed and 2 obsidian tools and 15 pieces of debitage were counted. The debitage consists entirely of opaque black obsidian tertiary and minute retouch flakes. Tools include a drill or graver and a Stage II biface fragment. No distinct artifact concentrations or features are present.

The historic component consists of crimped cans, matchstick milk cans, and indeterminate metal objects. The cans place the historic component between about 1915-1930. A very recent-appearing hearth is adjacent to the south side of the road.

One 25 x 25 cm shovel probe was excavated. The probe revealed brown silt loam with limestone inclusions to a depth of 30 cm. No artifacts were recovered from the shovel probe.

Both components of the site suggest this was a limited activity locality. The prehistoric tools and debitage indicate that resource procurement or processing or both occurred. The historic trash likely reflects sheep herding activity during the first thirty years of the 20th century. The lack of features, damaged site integrity, and residual sediment indicate that the site is unlikely to yield significant information concerning prehistoric or historic lifeways in this area of the Great Basin. Field documentation has likely exhausted the research potential of the site and it is recommended not eligible for inclusion in the NRHP.

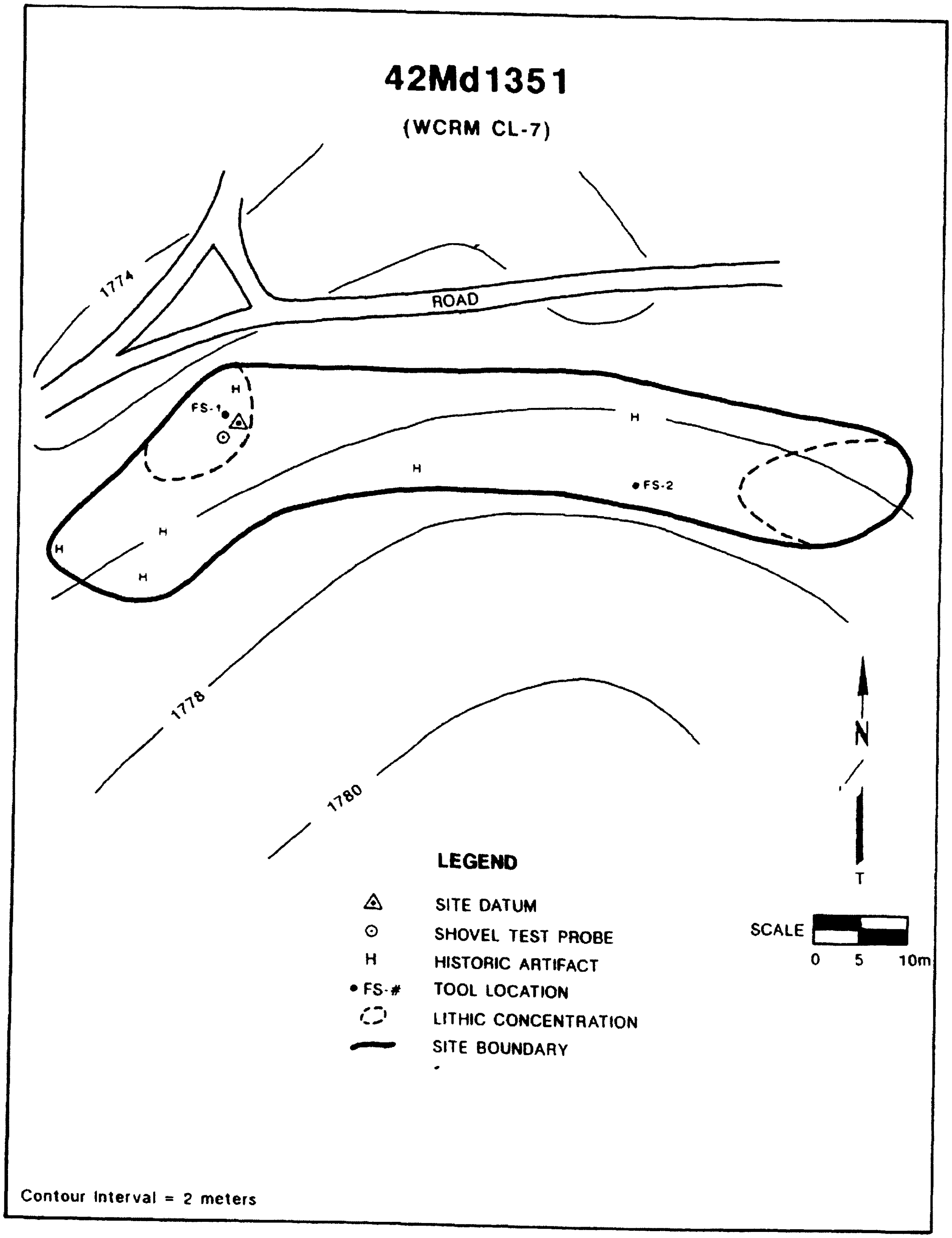

Figure 20. 42Md1351 site map.

Site 42Md1353 (WCRM CL-11). The site consists of a 75 m north/south x 37 m east/west lithic scatter (Figure 21) located on the southern slope and small saddle between two hills on a north/south-oriented limestone ridge (see Figure 4). Juniper and sagebrush are the most common vegetation. Sediment within the site consists of residual brown silt loam with a high percentage (>90 percent) of marble-sized pieces of angular limestone, and bedrock is exposed in some areas of the site. The site has been moderately to heavily impacted by sheetwash erosion.

A 100 percent lithic tally was completed, and 15 lithic tools and 21 pieces of debitage were counted. The debitage consists exclusively of obsidian of various types including semi-translucent, opaque, banded, and mahogany, but is dominated by an opaque to semi-translucent black. Tools include five retouched/utilized flakes, five biface fragments, and five projectile points (Figure 22). The projectile points include two Desert Side-notched, two Rose Spring Corner-notched, and one Cottonwood Triangular point. All of the projectile points are indicative of the Late Prehistoric or Fremont phases (about A.D. 400-1700). Neither distinct artifact concentrations nor features are present.

Two 25 x 25 x 35 cm shovel probes were excavated. Probe 1 was placed on the 18 degree slope of the site and Probe 2 was excavated into the nearly level sediment at the base of the small saddle. The probes revealed about 10 cm of brown silt loam with numerous gravel inclusions directly above a shallow, brown, carbonate rich C horizon with fewer pieces of gravel. No evidence of subsurface deposits was noted. The residual nature of the surrounding sediment and shallow nature of the carbonate-rich sediment above bedrock indicate that subsurface stratified deposits are extremely unlikely to be present. Neither of the two probes reached bedrock although bedrock in most of the site is near the surface.

The site appears to have functioned as a limited activity area. The debitage indicates that final stage core reduction and/or tool manufacturing occurred, and the projectile points (four with apparent impact fractures) and expedient tools suggests that the area may represent a kill and/or butchering locality.

The slope of the hill, exposed bedrock, damaged site integrity, lack of features, and sterile subsurface probes into residual sediment indicate that the site can yield no significant information concerning prehistoric lifeways in this part of the Great Basin. Field documentation has exhausted the research potential of the site and the site is recommended not eligible for inclusion in the NRHP.

Site 42Md1359 (WCRM CL-27). The site, which is a 42 m north/south by 30 m east/west prehistoric lithic scatter (Figure 23), is located on the west face of a north/south-trending ridge line (see Figure 4). Juniper, sagebrush, snakeweed, and bunch grasses are the most common vegetation. Site sediment, which appears to be residual, consists of brown silt loam with numerous inclusions of small limestone pieces. Two small drainages bisect the site, which has been moderately impacted by sheetwash erosion. Vehicular disturbance was noted along the west and north edge of the site.

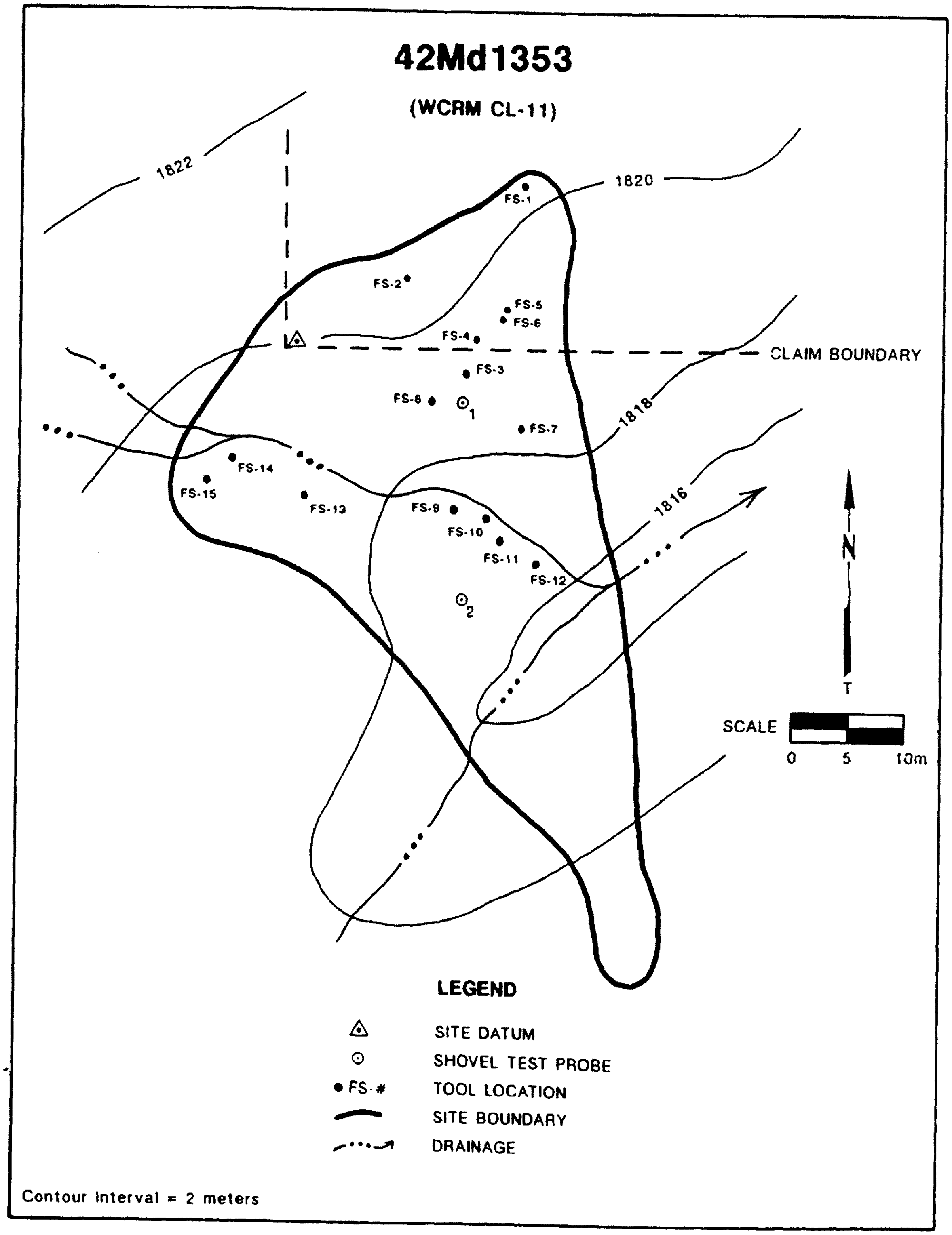

Figure 21. 42Md1353 site map.

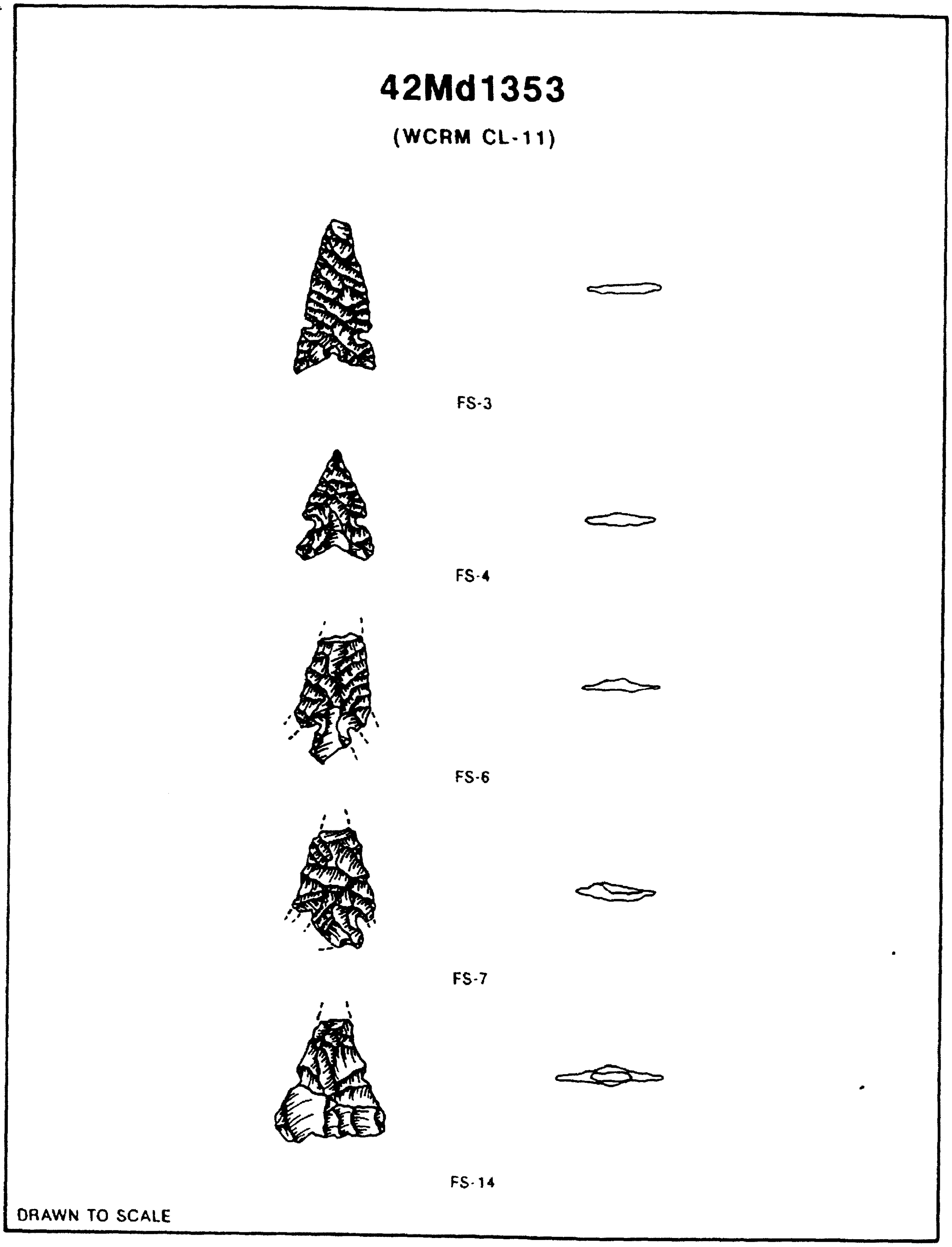

Figure 22. 42Md1353 projectile points.

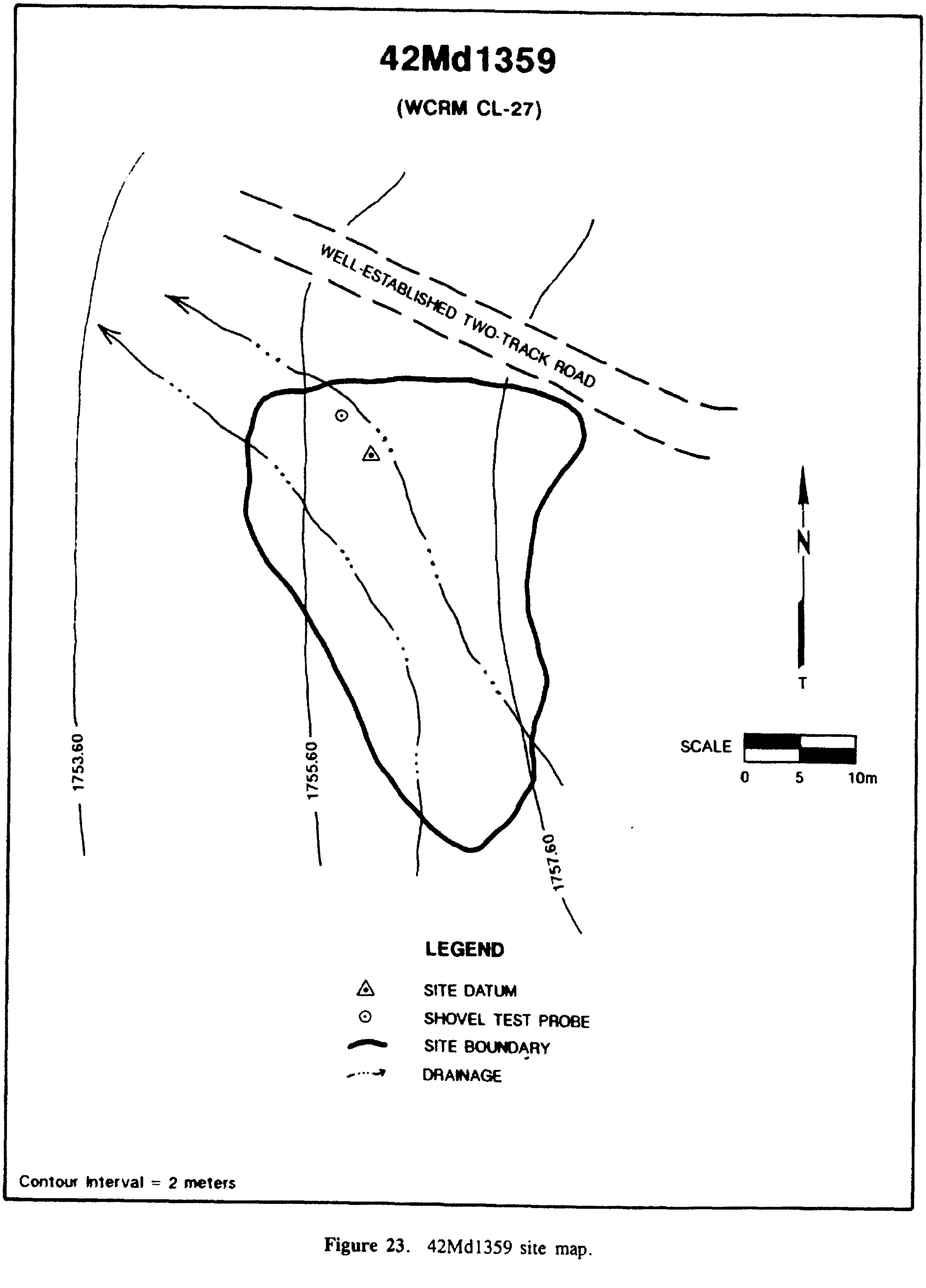

Figure 23. 42Md1359 site map.

A 100 percent artifact tally was conducted. Thirty-one pieces of debitage were counted. Neither distinct concentrations nor features are present.

One 25 x 25 x 30 cm shovel probe was excavated. The probe revealed brown silt loam with limestone inclusions to a depth of 30 cm. No artifacts were recovered from the shovel probe.

The site is indicative of a limited activity locale where resource procurement and/or processing occurred. The lack of features, damaged site integrity, homogeneous lithic assemblage, and predominantly residual sediment indicate that the site is unlikely to yield significant information concerning prehistoric lifeways in this part of the Great Basin. Field documentation has likely exhausted the research potential of the site; therefore, the site is recommended not eligible for inclusion in the NRHP.

Sites Reevaluated by WCRM

Of 19 reevaluated sites only two (42Md1141 and 1080) are considered significant and are recommended eligible for the NRHP (see Table 4). Fifteen of the 17 remaining previously recorded sites (42Md1116, 1123, 1125, 1126, 1127, 1138, 1139, 1140, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, and 1185) were examined by excavating one to three shovel probes to determine potential eligibility. Site 42Md1116 was not relocated and site 42Md1142 was reevaluated without a test probe. These 17 sites were found to be lacking the qualities that would make them eligible for inclusion in the NRHP.

Reevaluated Sites Recommended as Eligible for the NRHP

Site 42Md1080 is located within mine Tract A. Site 42Md1141 is located in mine Tract C. Both of these sites are recommended as eligible based on their artifact assemblages, good integrity, and potential for substantial buried deposits.

<u>Site 42Md1080 Update</u>. Site 42Md1080 was reevaluated by WCRM on September 25, 1996. The site boundaries were expanded, the lithic count was raised to over 300, and two subsurface probes were excavated. The site consists of a 28 m north/south by 65 m east/west lithic scatter (Figure 24) located on the end of a gently sloping north/south-oriented finger ridge (see Figure 2). The site is flanked on the southeast by a small drainage and on the north by a larger drainage. Sediment at the site consists of primarily colluvial and alluvial brown silt loam with numerous inclusions of angular and subangular pieces of limestone. The site has been minimally impacted by sheetwash erosion, which has likely displaced some of the surface assemblage; however, no significant erosional channels cut through the site.

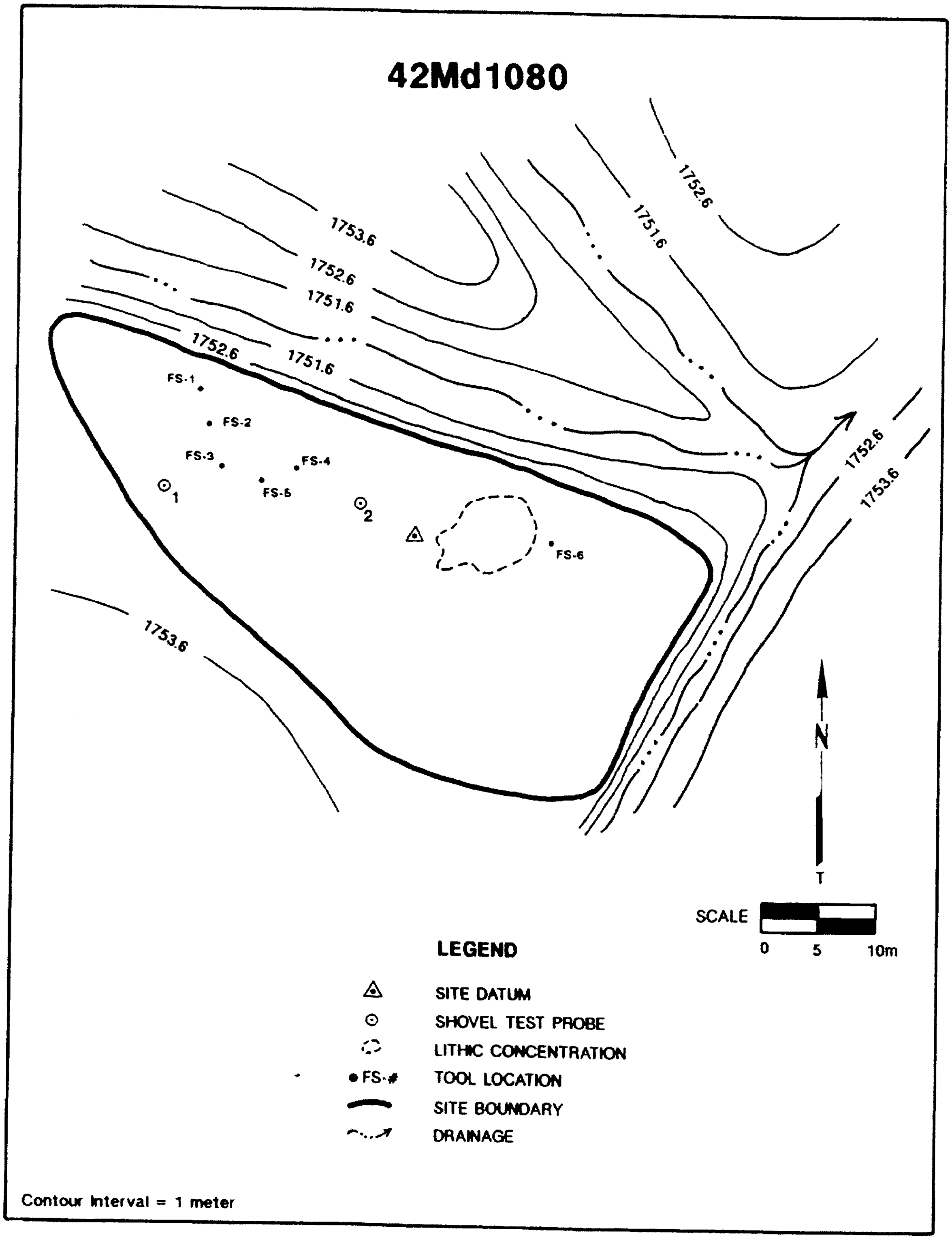

Figure 24. 42Md1080 site map.

An approximately 80 percent lithic tally was conducted and 287 pieces of obsidian debitage and 6 lithic tools were counted. Raw material is almost exclusively obsidian. A black opaque variety is most prevalent; however semi-translucent, snowflake, banded, and mahogany obsidian are also present. Debitage consists of 4 primary flakes, 18 secondary flakes, 97 tertiary flakes, and 7 pieces of shatter. Tools include two obsidian retouched/utilized flakes, one pink quartzite Stage II biface fragment, two obsidian Stage III biface fragments (including one indeterminate projectile point tip), and one obsidian multi-directional pebble core. No temporally diagnostic artifacts were observed, although a small Desert Side- and Basal-notched point was found during a July 6, 1995 site visit. This projectile point would suggest an occupation during the Late Prehistoric or Fremont phase (ca. A.D. 400-1700).

One large concentration (A) is present in the northeast corner of the site. The debitage is mostly by opaque obsidian tertiary flakes with few primary and secondary flakes present. A tally of 161 pieces of obsidian debitage in the concentration was an estimated 80 percent of the total assemblage. The debitage includes 5 primary flakes, 11 secondary flakes, 143 interior flakes, and 2 pieces of shatter.

Two 25 x 25 x 30 cm test probes were excavated and the fill screened through ¼-inch mesh. No cultural materials were uncovered. Test probe 1 was placed in the western portion of the site and probe 2 was placed in the central portion of the site. Two layers of stratigraphy were observed. The upper portion consists of gravel-laden brown silt loam and the underlying layer consists of a carbonate-rich brown silt loam. The upper layer appears to be an alluvial and colluvial deposit that extended predominantly from the ridge to the south. The underlying deposits likely are a mixture of colluvial materials and perhaps overbank alluvium originating from the large drainage. Although the test probes uncovered no subsurface artifacts, the potential for such deposits cannot be discounted within the colluvial sediments at the site. WCRM archaeologists observed numerous partially buried artifacts within the dense surface cluster.

The site appears to have functioned as a limited activity locale with tools and debitage indicating that resource procurement, processing, or both occurred. The concentration indicates that lithic reduction/tool production was conducted in specific areas. The small obsidian core, and primary, secondary, and tertiary flakes indicate that all stages of lithic reduction were ongoing, but the emphasis seems to be on the final stages of tool production and/or refurbishing. The primary and secondary flakes appear to be derived from small obsidian nodules. Parts of the site exhibit subsurface deposition and subsurface artifacts may be located deep enough to allow for obsidian hydration analysis.

The size and nature of the assemblage and the possibility of subsurface deposits suggest that potential exists to gain additional information concerning prehistoric lithic technology. The source of the obsidian, through trace element analysis, can be identified, which will provide information regarding prehistoric trade, exchange or patterns of seasonal transhumance. Information about lithic technology and obsidian sources will advance our knowledge of prehistoric lifeways in this area of the Great Basin. The site is recommended eligible for inclusion in the NRHP. Any treatment should include some additional subsurface testing.

Site 42Md1141 Update. The site, which was re-evaluated by WCRM on September 22, 1996, consists of an approximately 2.5 m wide and 6 m deep cave with a south-facing entrance (Figure 25). Two alcoves separated by a rock wall are present in the cave, one at the back and one to the east. Two vandal pits were noted by Archaeological Research Consultants (ARCON) during their June 14, 1994 survey (Norman 1994b). A test pit excavated by ARCON in one of the vandal holes revealed approximately 60 cm of deposition and three layers of stratigraphy. At that time an obsidian flake was noted on a compacted surface about 10 cm below the cave floor.

During the current reevaluation, WCRM noted two obsidian flakes near the dripline of the cave and relocated the wire-wrapped log and historic fire pit noted in the 1994 survey report. The fire pit has been disturbed and the rocks are piled up against the west cave wall. Sediments at the back of the cave are moist, indicating a possibly active seep. A distal piece of a tibia from a large mammal (antelope size) was found in a shallow pit at the mouth of the alcove at the rear of the cave. The proximal edge of the bone exhibits evidence of rodent gnawing and appears to have been cut.

During re-evaluation, a 25 x 25 cm shovel probe was excavated to a 30 cm depth in a depression just inside of the cave mouth, 1.1 m north of the dripline and 1.3 m east of the west wall. The probe revealed an abundance of silt with few rock inclusions. Charcoal pieces, some over 1 cm in size, were noted in the fill. A tip of a bone awl was collected from an approximate depth of 30 cm (Figure 26). In addition, several bone fragments were recovered, as well as a piece of ungulate tooth enamel. Excavation was halted when a reddish sediment was reached (30 cm deep) and the test pit was back-filled with the rocks from the disturbed fireplace. Bedrock was not reached. Some rodent disturbance was noted in the profiles of the probe, but the stratigraphy appeared to be intact. The site does not appear to have been seriously vandalized.

The site exhibits good integrity, has a small surface artifact assemblage, and contains intact stratigraphy with subsurface cultural materials. Evidence of multiple occupations may be present. The stratified cave site has the potential to further our knowledge of prehistoric lifeways in this area of the Great Basin; therefore, the site is recommended eligible for the NRHP.

Reevaluated Sites Recommended Non-Eligible

Sites 42Md1123, 1125, 1126, 1139, 1142, 1143, 1148 and 1185 are archaeological sites, but are not recommended as eligible. 42Md1123 has buried, but minor, cultural deposits. Site 42Md1116 was not located, as was the case during an earlier visit by mine personnel, BLM, and WCRM. Based on our examination of the area and site sketch

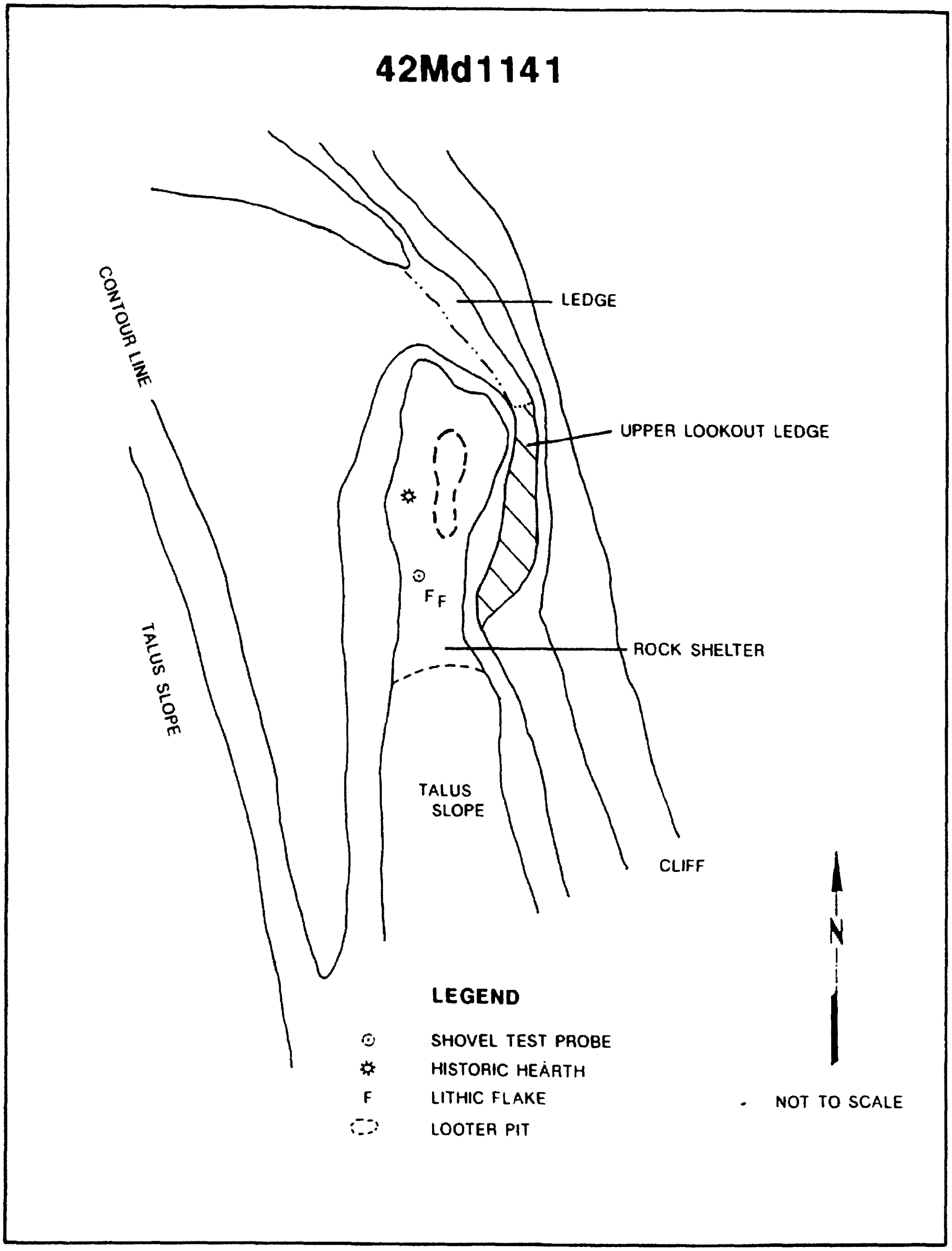

Figure 25. 42Md1141 site map.

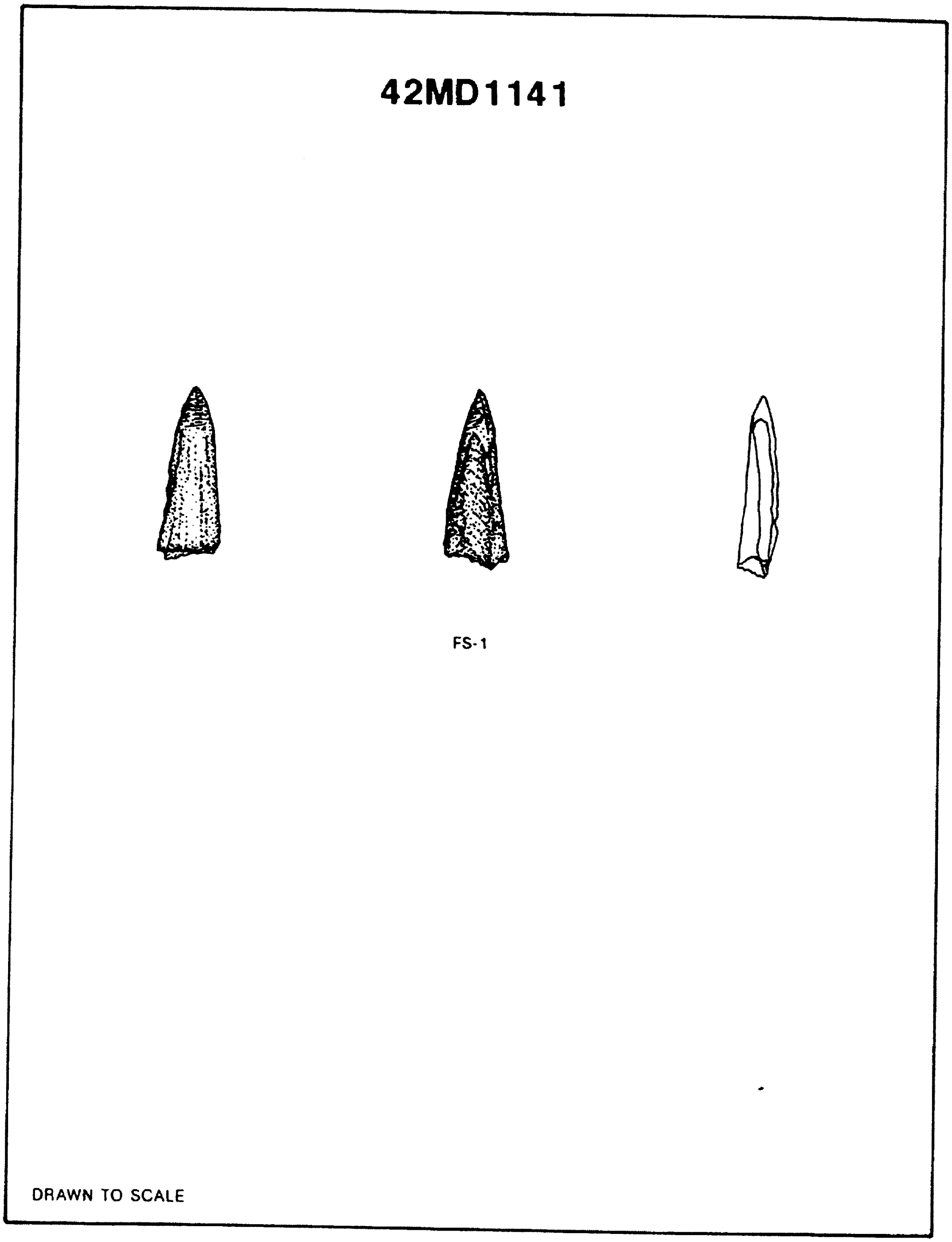

Figure 26. 42Md1141 bone tool.

maps, we believe that 42Md1116 and 1125 are the same site. 42Md1126 may have eligible deposits, but it has been looted and now lacks integrity. 42Md1139 contained few artifacts and lacked deposition indicating that the site does not contain information sufficient to advance our knowledge of prehistoric lifeways. Based on observations made during flagging, the boundaries of two of the previously recorded sites (42Md1142, 42Md1143) were modified and both sites were re-mapped to more accurately reflect their boundaries. WCRM concurs with the previous evaluation for these two sites of non-eligibility as recommended by ARCON (Norman 1994b).

One site, 42Md1185, contained buried deposits, including historic cans, in two features, either privies or trash pits. Two episodes of site use are apparent; nevertheless, the buried deposits appear to be restricted to the features, and the cultural assemblage in them is limited. It is felt that significant information cannot be recovered from 42Md1185, and that it is not recommended as eligible to the NRHP.

Site 42Md1116. An attempt was made by WCRM to relocate 42Md1116 on September 22, 1996. The site could not be located as mapped therefore, it could not be reevaluated. A previous attempt by mine, BLM, and WCRM personnel also failed to relocate the site. It is believed that this site is actually the same site as 42Md1125. This belief is based on close reexamination of at least a 40 acre area around the mapped location, the site description of the site location, and the site map. It is recommended that 42Md1116 and 1125 be considered the same site. It is further recommended that the site receive the earliest recorded site number (42Md1116), but the site location be that of 42Md1125.

Site 42Md1123. In 1994 this site was recorded by ARCON as a 5 m long, 1 m deep, and 1 m high rock shelter with a south-facing opening in a rock outcrop at the base of a hill (Norman 1994a) (see Figure 3). During the 1996 reevaluation by WCRM, the site surface was found to contain chunks of charcoal and large mammal bones, some of which are burned. Packrat activity is apparent on a ledge above the floor. A rope that was mentioned in the ARCON 5/24/94 report was found and the rock "wall" or windbreak was determined to more likely be roof fall. None of the other material identified during the 1994 inventory was present.

During the reevaluation two shovel probes were excavated (Figure 27). Both probes exposed gray-brown silt with extensive angular limestone pieces. The A horizon is about 8 cm thick and the lower silt may be a C horizon, but no evidence of a structure was noted. The first 25 x 25 cm shovel probe, which was placed south of the rear wall of the shelter, 1.4 m west of the east wall, and just inside the dripline, was excavated to a depth of 35 cm. The fill was ¼-inch screened and small chunks of charcoal and some bone were found. The shovel probe which terminated at 30 cm contained mammal bone, which was collected. Shovel Probe 2 was placed on the apron outside of the shelter. It terminated at bedrock 25 cm below the ground surface. Chunks of charcoal, two obsidian flakes, and three pieces of bone including a piece of ungulate tooth enamel, were recovered from the upper portion of the probe. It appears that the accumulation of material in the shelter can be attributed to packrat activity but the material in front of the shelter is cultural.

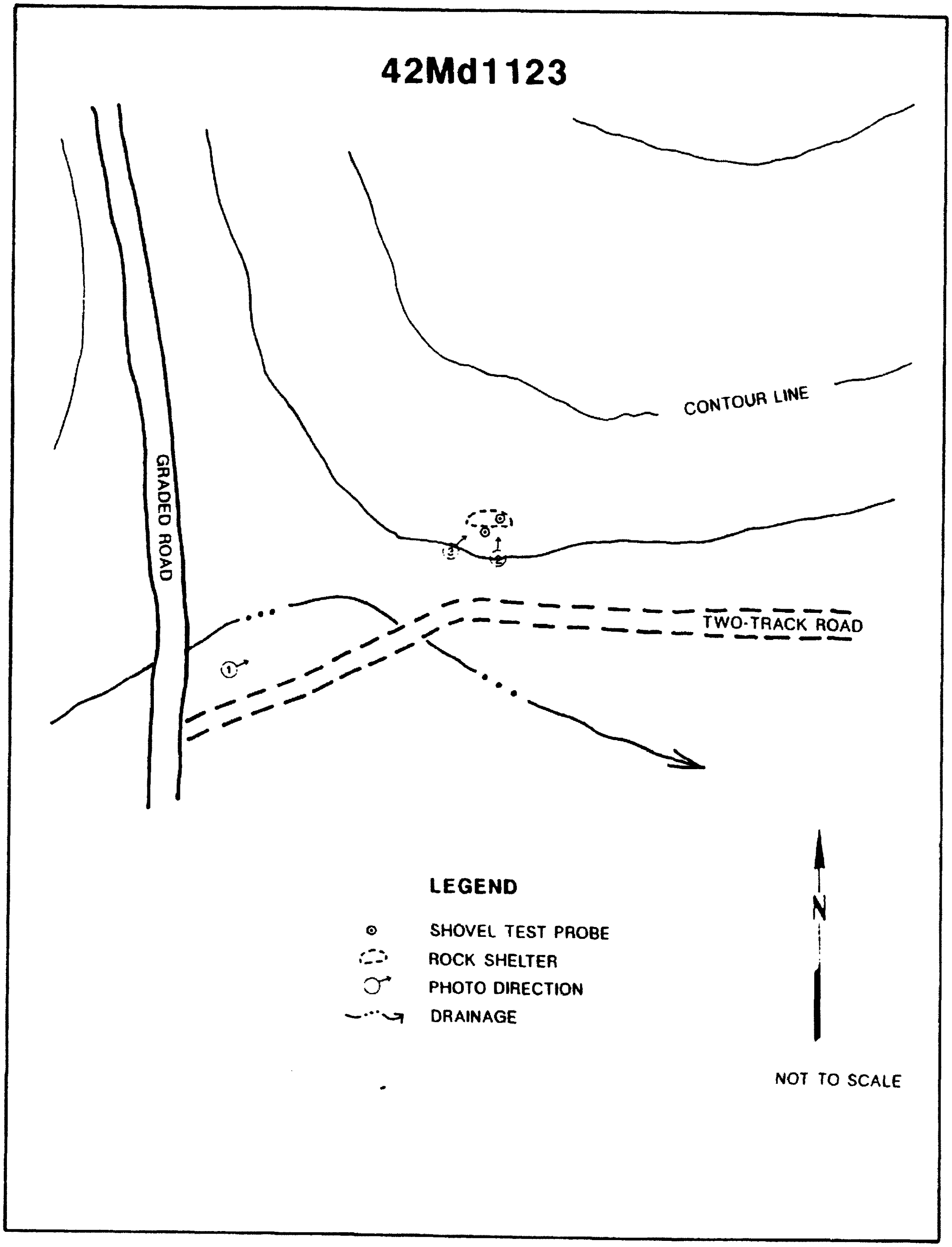

Figure 27. 42Md1123 site map.

Based on the lack of well-defined stratigraphic deposits and paucity of artifacts, the site is considered insignificant and is recommended not eligible to the NRHP.

Site 42Md1125. Site 42Md1125, which was reevaluated by WCRM on September 22, 1996, originally consisted of three flakes and a white chert drill on a small saddle (see Figure 2). No other material was located. One 25 x 25 cm shovel probe was excavated to a depth of 25 cm in the area between the three flakes and the drill (Figure 28). The surface sediment consists of residual brown silt loam with a high percentage of limestone gravel. The probe uncovered a calcareous brown silt loam that contained inclusions of limestone gravel; bedrock was reached at a depth of 25 cm. No features are present.

The residual sediment, paucity of artifacts, and lack of potential for buried cultural deposits indicate that the site is unlikely to yield significant information concerning prehistoric lifeways in this part of the Great Basin. Field documentation has likely exhausted the research potential of the site; therefore, the site is recommended not eligible for inclusion in the NRHP.

Site 42Md1126. WCRM reevaluated this site on September 22, 1996. The site consists of a rockshelter with an opening 1.5 m wide by 1 m deep by 1 m high, and a surface that consists of loose packrat midden materials (see Figure 2). The beer bottle mentioned in the May 1994 ARCON report (Norman 1994a) was relocated, but the black obsidian scraper was not. A 25 x 25 cm shovel probe was excavated 80 cm back from the dripline and 90 cm east of the west wall (Figure 29). The probe revealed 5 cm of fractured limestone with a minimal amount of silt. No cultural materials or organics were recovered from the probe. The presence of the beer bottle and contents of the shelter indicates that the site was looted.

The lack of stratified deposits, damaged site integrity, and paucity of artifacts indicate that the site is unlikely to yield any information concerning prehistoric lifeways in this part of the Great Basin. Field documentation has likely exhausted the research potential of the site; the site is recommended not eligible for inclusion in the NRHP.

Site 42Md1139. This site was originally recorded by ARCON in 1994 as a 2 x 6 m prehistoric lithic scatter located on the south side of a saddle (Norman 1994b) (see Figure 4). The scatter consisted of less than 20 artifacts, including two tools. Only two flakes were found; one in the concentration and one outside (Figure 30). The residual sediments are composed of about a 3 cm thick gravel-capped silt layer over shale-like crumbly limestone, which precludes significant deposition.

In addition to an intense surface examination, the 1996 reevaluation of the site by WCRM included the placement of a 25 x 25 cm shovel probe in the upper north edge of the originally defined small artifact concentration. Screening of the probe fill failed to produce anything but platy angular limestone.

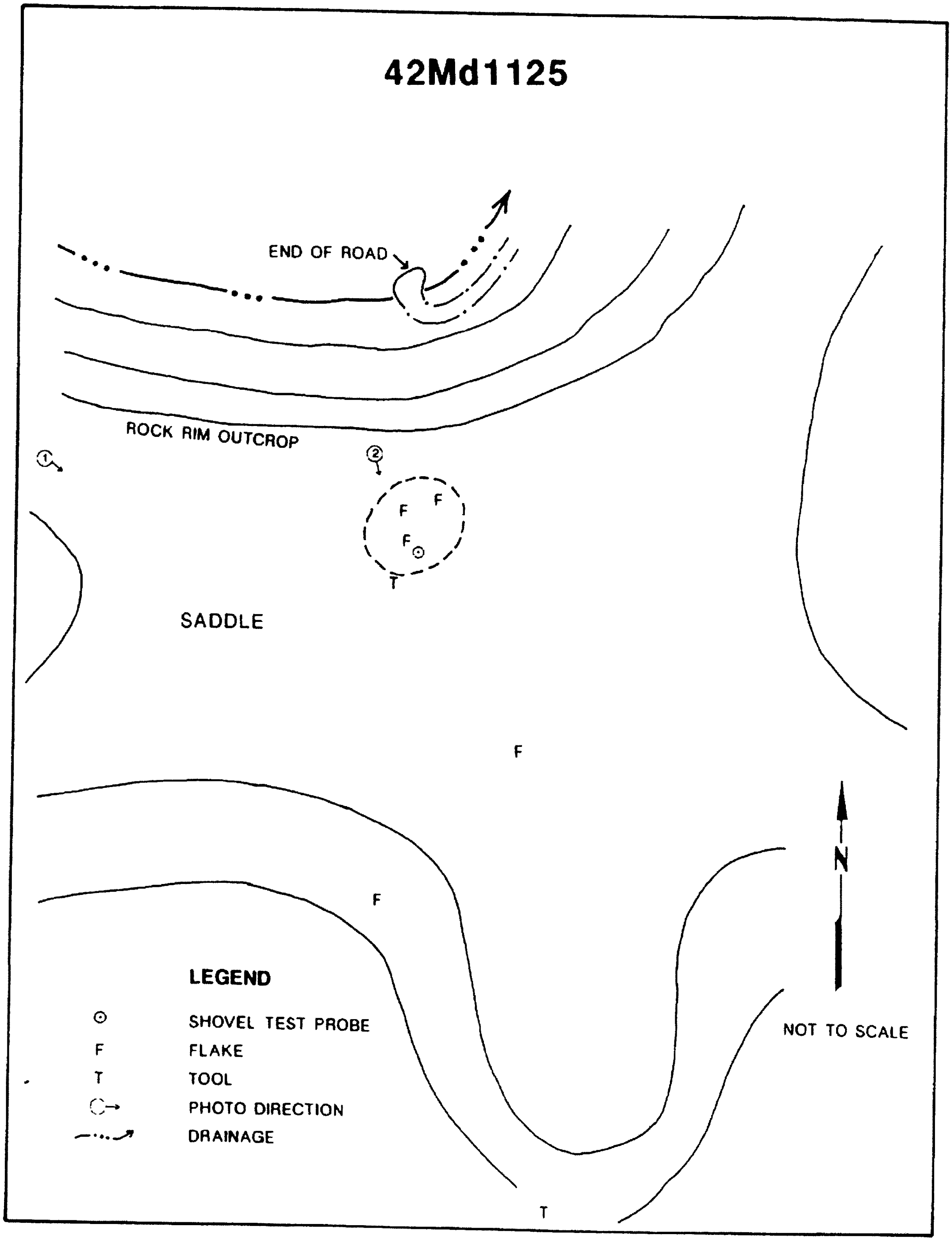

Figure 28. 42Md1125 site map.

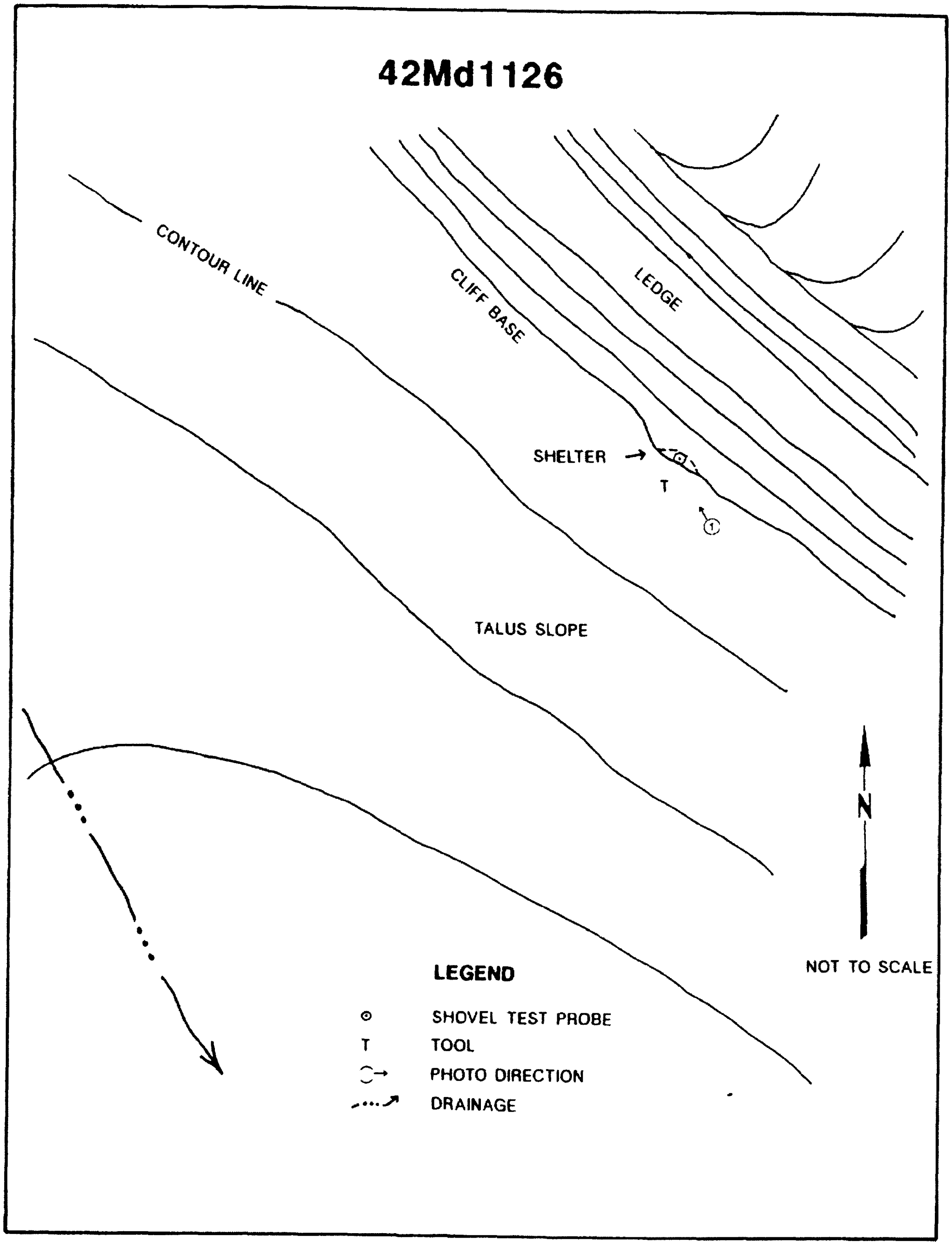

Figure 29. 42Md1126 site map.

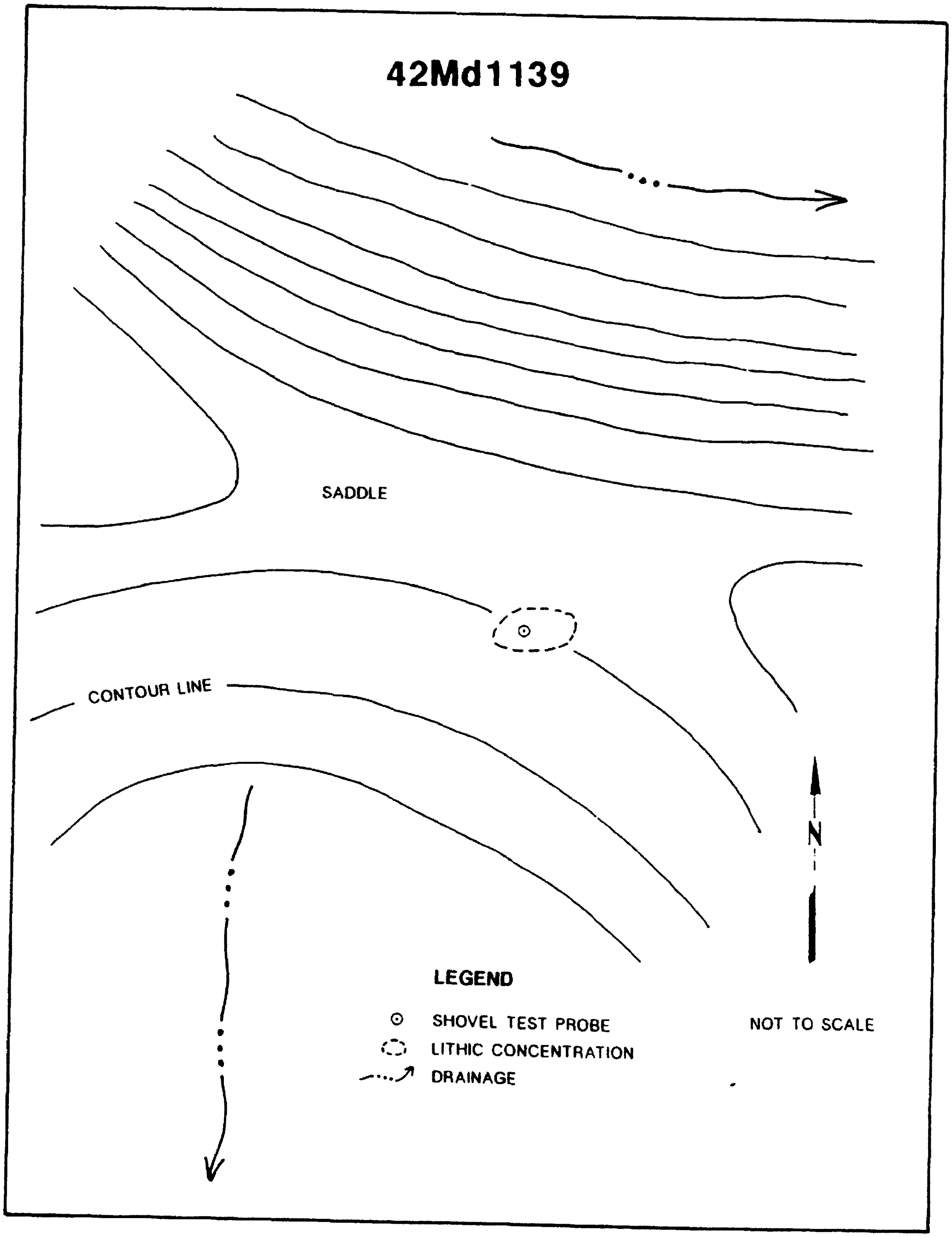

Figure 30. 42Md1139 site map.

Based on the lack of deposition and paucity of artifacts the site does not contain information sufficient to advance our knowledge of prehistoric lifeways in this part of the Great Basin. Field documentation has likely exhausted the research potential of the site; therefore, the site is recommended not eligible for inclusion in the NRHP.

Site 42Md1142. Although this site did not require reevaluation, WCRM updated the site form as a result of observations made during temporary fencing operations conducted at the request of the BLM and Continental Lime, Inc. The update consists of a new map and details of tin cans that refine site occupation dates.

The site, which is situated on fairly level to slightly undulating ground adjacent to a graded road, is cut by three branches of an intermittent drainage (Figure 31). A 13 x 8 m concentration of historic tin cans (13) is located between two of the drainage fingers, and additional historic tin cans are sparsely scattered throughout the general area. Two cans were observed with "Punch Here" embossed on the lid; thus, dating the site to 1935-1945 (University of Utah et al. 1992:471-9). In addition, a metal bucket was found adjacent to one branch of the drainage. The majority of cans were found in the drainages, but not exclusively.

The potential for subsurface materials is present because of alluvial activity, but it is likely that if material is subsurface it was purposefully buried as trash and is identical to the surface scatter. The site does not appear to contain artifacts or information that would contribute to our understanding of the history of sheep camps in the area. WCRM concurs with the initial evaluation that the site is insignificant and not eligible for the NRHP.

Site 42Md1143. This site did not require reevaluation, but WCRM updated the site form as a result of observations made during temporary fencing operations conducted at the request of the BLM and Continental Lime, Inc. The update consists of redefining the site boundary and drawing a new site map to reflect the change (Figure 32).

Because the entire valley could be classified as a dispersed sheep camp, it was decided to more critically examine and identify the elements that could define the camp, rather than including the extensive scatter of tin cans and household products found sparsely scattered throughout the area. As a result of this examination, the units originally found at each end of the site have been reclassified as isolates and the central unit has been identified as the site. The site, which now measures 60 m east/west by 30 m north/south, contains tobacco, evaporated milk, and fruit cans and an arrangement of four rocks that initially were identified as a rock-lined fire-pit. One tobacco can was found adjacent to the rock alignment. A 25 x 25 cm shovel probe was placed in the rock alignment, and roots, rocks, small pieces of wood, one possible thermal rock spall, and four pea-sized pieces of charcoal were found. A second 25 cm diameter test unit was placed in a slight depression located east of the hearth. It contained one obsidian microflake (10 x 7 x 1 mm), and roots, broken rock, and gravel. Because the microflake was found in the first shallow probe attempt, the flake may have been invisible in the matted grass that covered the depression rather than being buried.

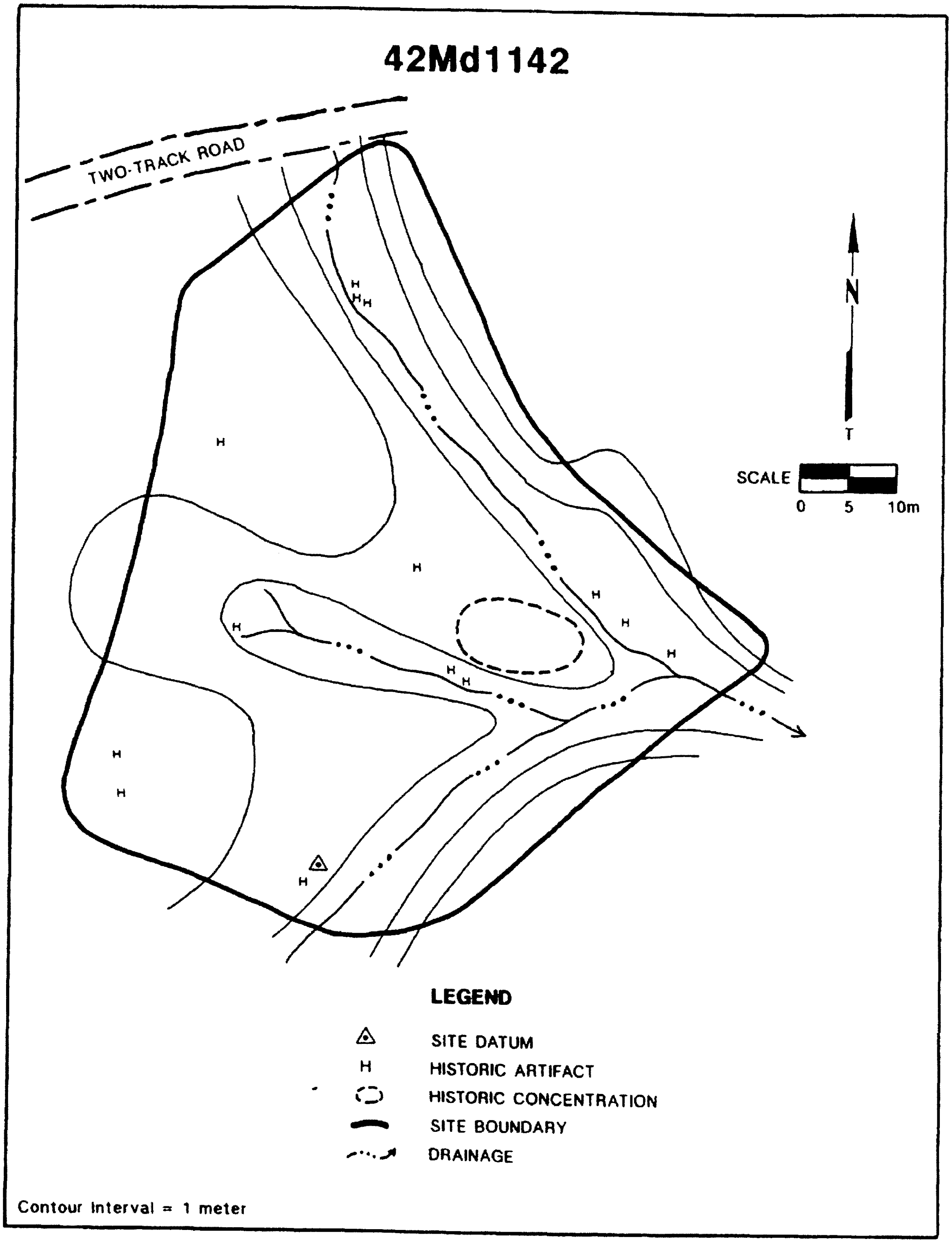

Figure 31. 42Md1142 site map.

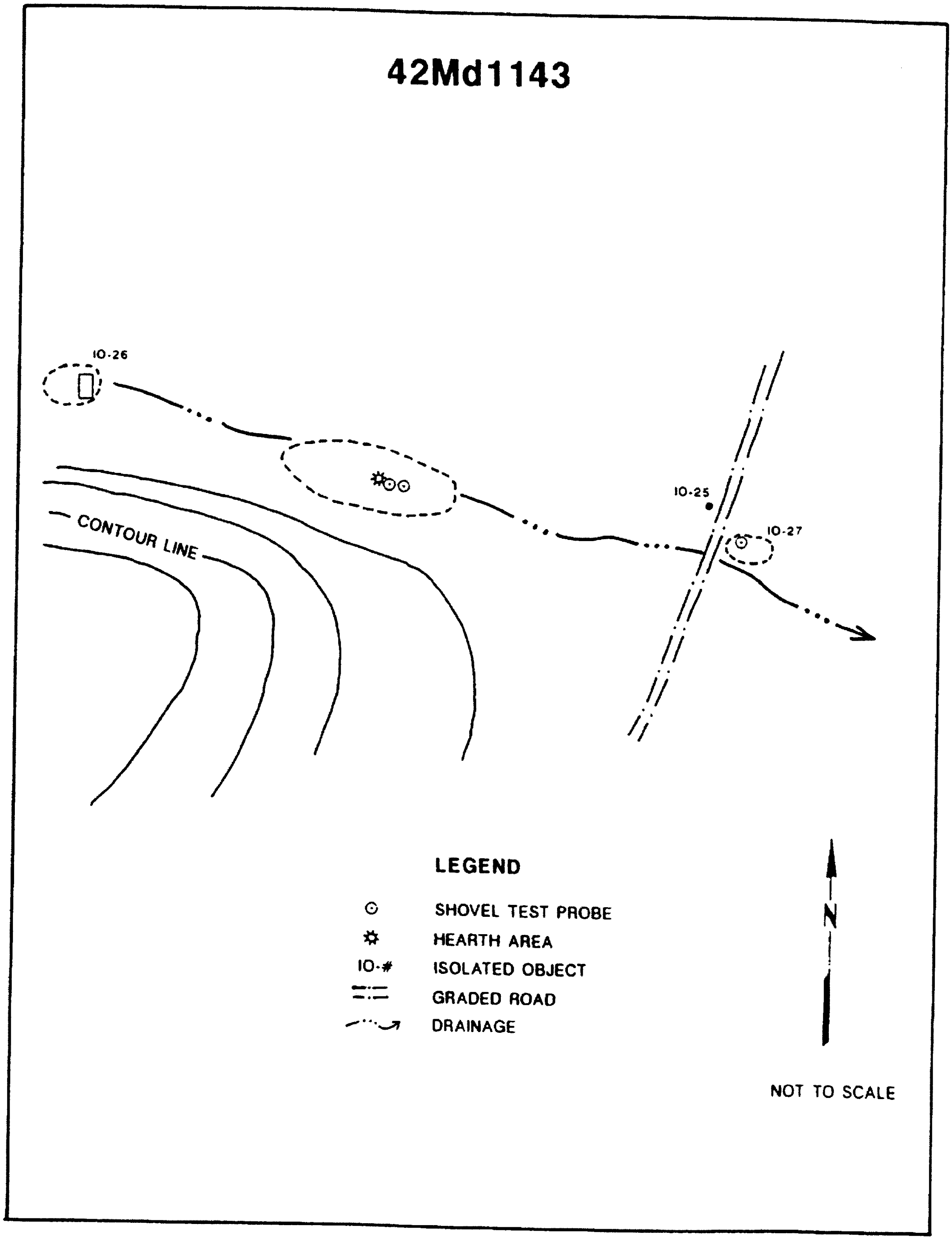

Figure 32. 42Md1143 site map.

A wash pan noted during the original survey was not found, and bottles and glass were also sparse.

Two elements of the original site have been recorded as isolates (IOs) rather than as part of the site. What had been originally identified as the west unit of the site has been recorded as IO 26, which contains two hole-in-top cans, one unidentified can, one "church key" opened can, a 3/4" metal strip, and one 5 ¼" diameter squat coffee can.

The east unit is now IO 27. One white GMC hubcap, one unidentifiable can, and a partially buried 3/4" diameter cable comprise the isolate. The original report mentioned a depression within the unit, and after extensive deliberation, an area that may possibly be perceived as a depression was tested. A 25 x 25 cm shovel probe failed to expose evidence of cultural remains.

All three test probes contained brown loamy silt with a tendency to become slightly clayey with depth. At about 10 cm below the surface the soil became more compact and caliche inclusions were prominent. Grass, roots, and gravel were also found in the shovel probe holes. The flake that was found in test probe 2 may have been embedded in the matted grass that covered the depression rather than having been buried.

The additional investigation of 42Md1143 did not alter the original assessment of eligibility. The site is viewed as not significant, with little potential for advancing the understanding of sheep herding activities in the area. Field documentation has likely exhausted the research potential of the site; therefore, the site is recommended not eligible for the NRHP.

Site 42Md1148. In June of 1994, ARCON described the site as a 4 x 5 m prehistoric lithic scatter located on a saddle along a game trail (Norman 1994b) (see Figure 4). In September 1996, WCRM reevaluated the site and found it to be covered by a desert pavement-like surface. No artifacts were located. A 25 x 25 cm shovel probe was placed within the boundary identified during the 1994 survey (Figure 33). The gravelly surface caps 15 cm of silt and limestone gravel. The gray brown A Horizon overlies a tan B Horizon. At 15 cm below the surface a very compact B horizon with subround (0.5 cm diameter) chunks of moderately plastic clay was encountered. The fill from the probe was screened through 1/16-inch screen to insure that potential microflakes from ant activity would not be missed. No artifacts were recovered.

Based on the absence of artifacts, and the lack of stratified deposits, the site does not exhibit the potential to contain significant information concerning the prehistory of the area and is recommended not eligible for the NRHP.

Site 42Md1185. The site, which had been erroneously reported as 42Md1180 by ARCON (Norman 1995) during a 1994 site visit, was reevaluated by WCRM in September 1996. ARCON described the site as an 15 x 20 m extended seasonal campsite related to early

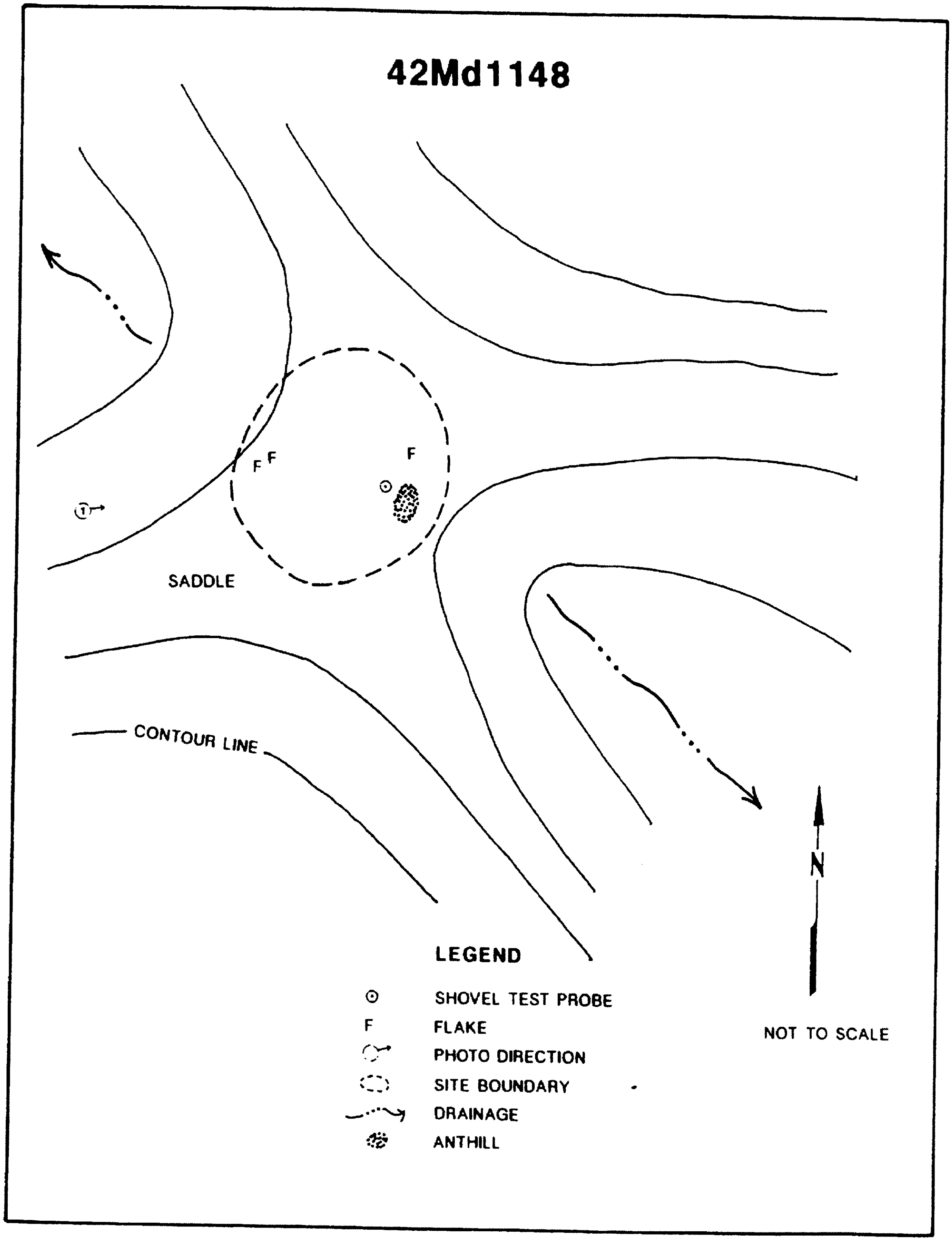

Figure 33. 42Md1148 site map.

ranching or mining activity and identified five features, including a meter-wide rock cairn in a depression, and four other depressions, each about a meter wide. Artifacts previously identified included a late 1800s double solder tin can, metal box type kitchen cooking stove, and scattered tin cans. In addition to the above, WCRM observed several milled wood (2 x 4s) fragments west of the stove, and a vent hole can located east/southeast of the stove across the road from the features. Two additional depressions were noted east of the stove on the opposite side of the road (Figure 34). The dimensions of the "ranching wagon trail" mentioned in the ARCON report was observed to fit a modern four-wheel drive vehicle. The site has also been impacted by erosion and two roads.

WCRM placed three shovel probes in the site. Probe 1, which measured 30 x 30 cm, was excavated to a depth of 30 cm. It was placed on the south side of the cairn in the depression. The probe uncovered angular to subangular limestone gravel with reddish tan silt, apparently representing a B Horizon. The coarse-grained sediment indicates high energy alluvial transport. A black asphalt-like substance was located slightly subsurface and immediately north of the probe. No cultural materials were uncovered in Probe 1.

Probe 2 was excavated in the center of the depression located north of the stove and 18 m and 39 degrees from the north edge of the cairn. A can was in the depression on the surface prior to excavation of the probe. The probe measured 30 x 30 cm and was excavated to a depth of 20 cm. Sediments exposed in the probe consist of gravel-laden brown silt similar to those in Probe 1; however, the sediment did not turn red at depth, suggesting it may represent a disturbed B Horizon. The probe uncovered the weathered tip of a wooden lathe and three sanitary cans from the 1950s. The depression appears to represent either a privy or trash pit.

Probe 3 was placed in a previously unmapped depression located east of the stove on the opposite side of the road. The sediment contained less gravel than the previous two probes. A vent hole can was recovered from the test probe at a depth of about 20 cm. The depression may represent an older trash pit or privy.

The site appears to contain two elements of occupation. The double solder end tin cans likely represent the earliest component from around 1875-1903. The sanitary and vent hole cans represent the later component. The damaged integrity and paucity of artifacts indicates that the site can yield no significant information regarding sheep and/or prospecting activity during the early to middle part of the century. The site is recommended not eligible for inclusion in the NRHP.

Reevaluated Sites Recommended as Not Cultural

Eight of the rockshelters and caves (42Md1127, 1138, 1140, 1144, 1145, 1146, 1147, and 1149) produced no evidence of cultural material, with the exception of burned bones that, if cultural, were transported by packrats and are out of site context. These shelters and caves have no evidence that they are archaeological sites.

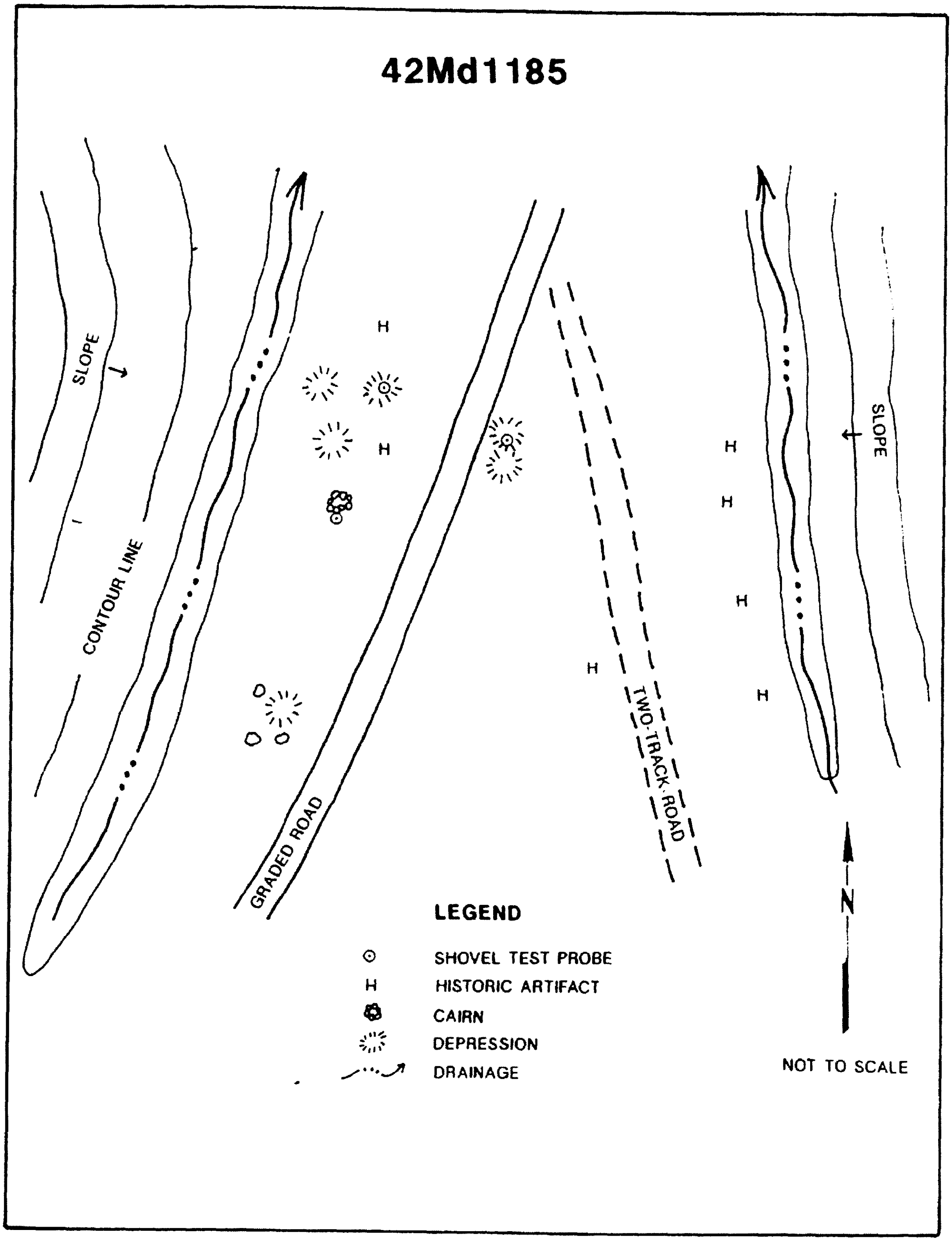

Figure 34. 42Md1185 site map.

Site 42Md1127. An inventory conducted by ARCON in 1994 (Norman 1994a) identified the site as a heavily vandalized prehistoric rock shelter that measured 2.5 m wide x 2.0 m deep x 1.0 m high (Figure 35). In September 1996, WCRM reevaluated the site. Two 25 x 25 cm shovel probes were placed in the shelter. The first probe was placed in a 1-m -wide strip, which is the only space available for buried deposits. The probe is 1.28 m from the dripline and 1.20 m south of the north wall in an area of least disturbance. Bedrock was reached at less than 5 cm and small pieces (+/- 3 cm) of fractured limestone were the only sediments present. A second 25 x 25 cm probe was placed at the dripline. Packrat feces mixed with sediments, coarse limestone, and small gravel was encountered, with sparse organic material also present.

The absence of stratified deposits and artifacts suggest that this site does not contain any potential to provide additional information regarding prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1138. In the 1994 ARCON inventory (Norman 1994b) this site was described as a 2.0 x 1.0 x 1.5 m prehistoric rock shelter with a large packrat midden and 20 cm of fill (Figure 36).

The shelter, as observed during the current project, was almost totally filled with a large brushy packrat midden that has mammal bones on the surface. During the reevaluation, a 25 x 30 cm shovel probe was dug to bedrock at 30 cm below the surface. The probe was placed about 50 cm inside the dripline and 30 cm off the south wall. The probe revealed the packrat midden, 11 cm of pine needles, duff, and packrat feces over a well-indurated silty deposit, and 3 to 4 cm of charcoal over limestone bedrock. Nothing was present to suggest that the charcoal was cultural. Foamy-textured indurated gray silt was present, coming out of the shovel probe as loosely consolidated chunks. The texture and induration suggests it represents travertine or a similar material in the process of formation. The gray color may be charcoal stain from a feature under the brushy midden but the gray color is believed to be from the dark mineral stain on the cave walls and not charcoal at all.

The lack of stratified deposits and absence of artifacts suggest this site does not retain any information that would contribute to our understanding of prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42MD1140. An inventory conducted by ARCON in 1994 identified the site as a rock shelter with an entrance of 3.0 m high with a 2.0 x 3.0 m platform floor at the entrance (Norman 1994b). The shelter was located on the side of a limestone cliff and extended about 10 m to the rear floor level with deep, wind blown fill. Apparent smoke blackening on the ceiling was originally observed. The original test pit was excavated to a depth of .20 m and revealed animal bones. In addition, some possible human bone was located on the surface and reburied by the original investigator.

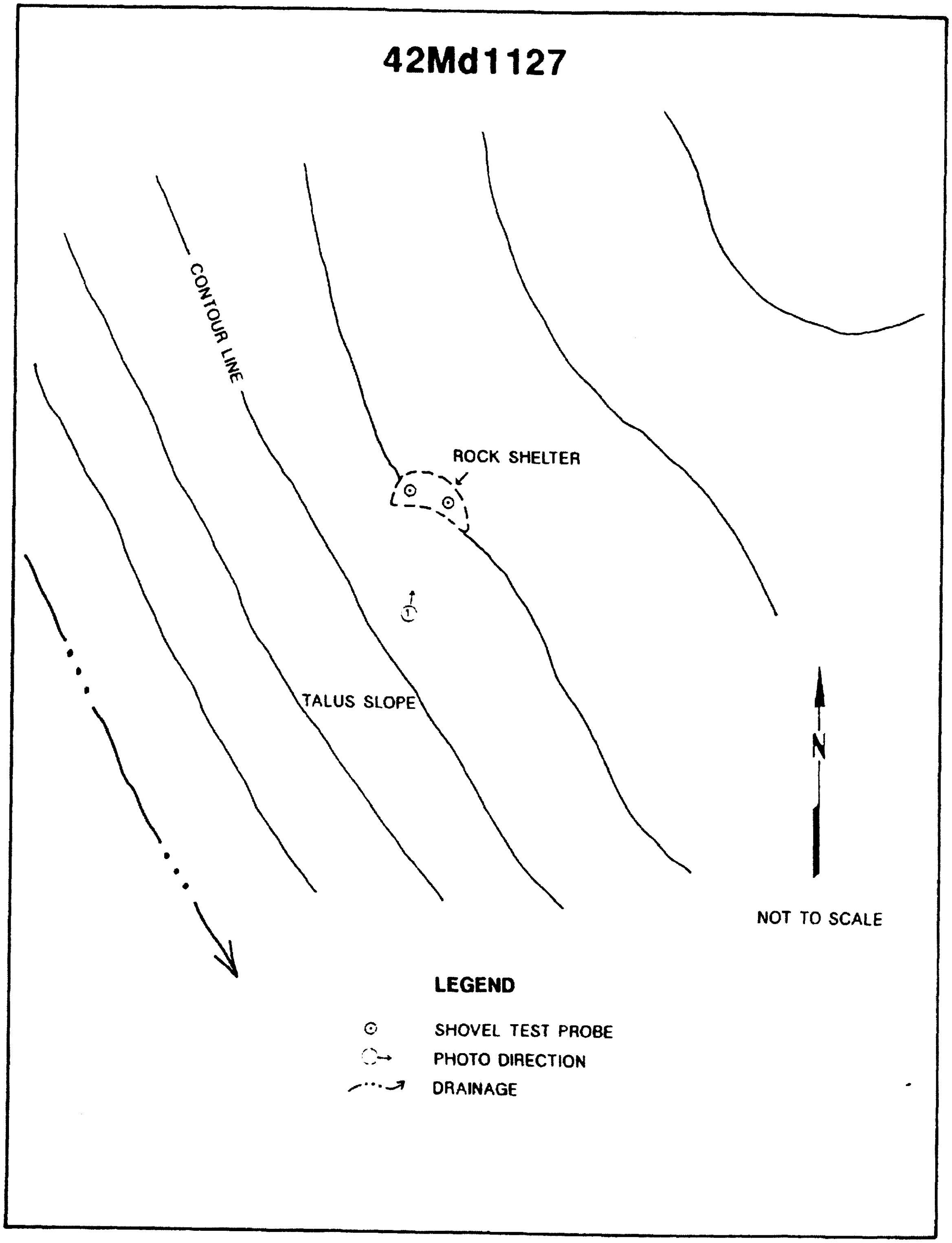

Figure 35. 42Md1127 location map.

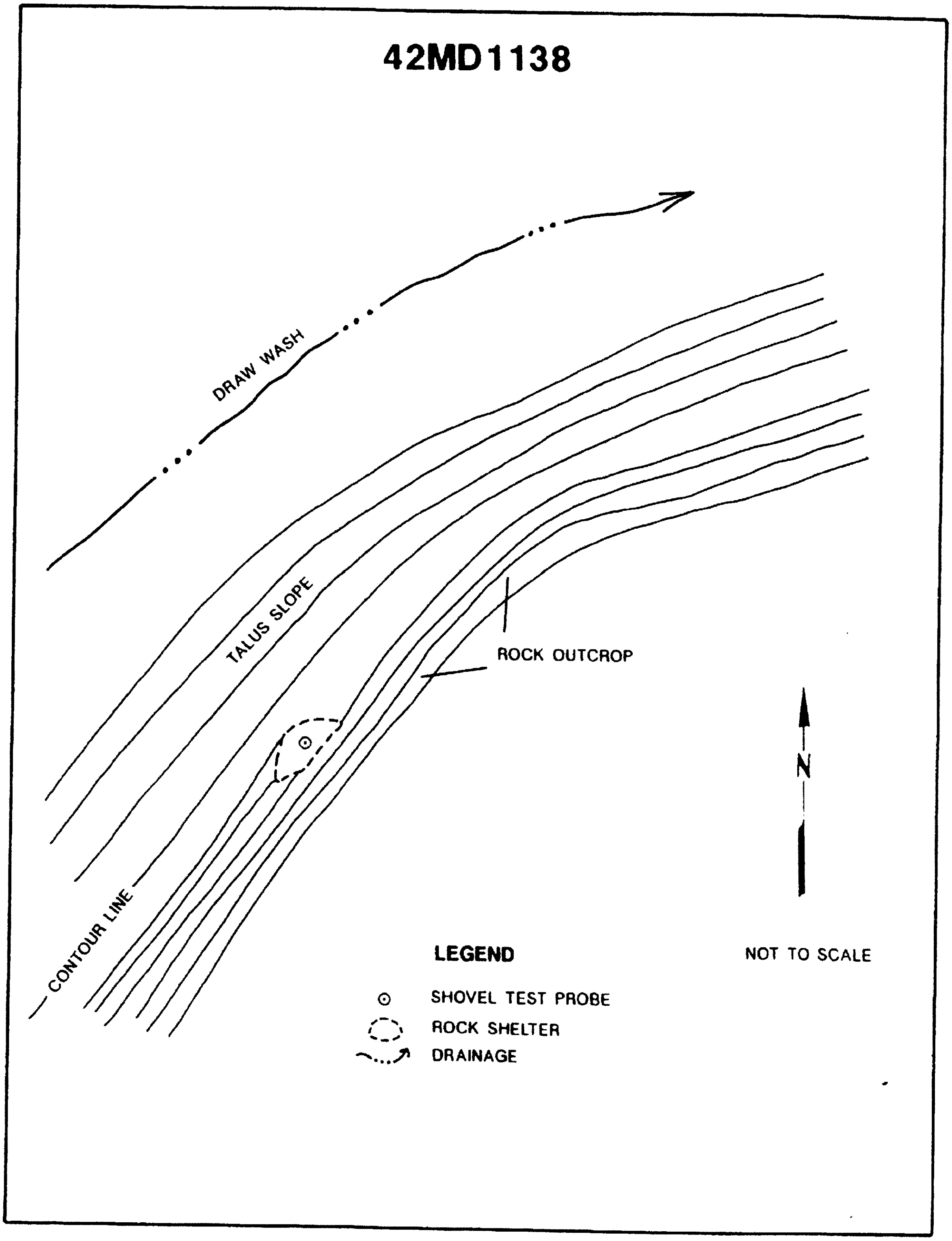

Figure 36. 42Md1138 location map.

In September 1996, WCRM, through an error, excavated a test pit inside the shelter. The test pit was not required. One 25 x 25 cm shovel probe was placed in the front chamber of the shelter. The probe uncovered 40 cm of sediment with inclusions of numerous small faunal remains. The remains included jack rabbit and a badger humerus. However, no stratified deposits appeared to be present and none of the faunal remains were culturally modified. No artifacts were located in the probe or observed on the surface. No smoke blackening was observed.

The absence of stratified deposits and artifacts suggests that this site does not contain any potential to provide additional information regarding prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1144. On September 23, 1996, WCRM personnel reevaluated the site, which consists of a cave with a 3 m wide entrance, a depth of into the cliff of approximately 3 m, and a large window opening above the entrance (Figure 37). From the mouth of the cave, the apparent floor slopes steeply upward. No cultural remains were observed on the surface of the shelter during the ARCON 1994 site visit, nor were any observed during the reevaluation. Site surface sediment consists of a loose mixture of vegetal and fecal materials; an active pack rat nest is present. One 25 x 25 cm shovel probe was placed inside the shelter, 1.3 m south of the dripline. The probe, which was excavated to a depth of 20 cm, uncovered three layers. The upper 5 cm consists of loose packrat midden materials that overlay 10 cm of slightly compact gray silt loam above 5 cm of loose brown silt loam. Inclusions of plant materials, small unburned bone, and small angular limestone gravel were present. No evidence of subsurface cultural material was observed.

The lack of cultural materials, a sterile test probe, and the steep angle of the deposits indicate that the site is unlikely to yield any information concerning prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1145. The site was initially recorded by ARCON on June 16, 1994 as a small, several meter deep rock shelter, with an south-facing opening of about 1 x 1 m (Norman 1995b) (Figure 38). No cultural remains were observed on the surface during that visit.

WCRM reevaluated the site on September 23, 1996, and no cultural remains were observed. The surface sediment consists of a loose mixture of vegetal and fecal materials. Two 25 x 25 cm probes were placed in the shelter. Probe 1, which was located 1.2 m north of the entrance and 0.90 m east of the west wall, was excavated to a depth of 30 cm. The probe dimensions expanded due to wall collapse. The upper 10 cm consists of predominantly packrat midden matrix above about 20 cm of reddish brown silt loam with few inclusions of limestone rock. The layers appeared to be intact. Several pieces of vertebrate fauna were recovered. Several rabbit bones and numerous small rodent-sized bones appeared fresh; one of the bones appeared to have been burned. Probe 2 was excavated in the center

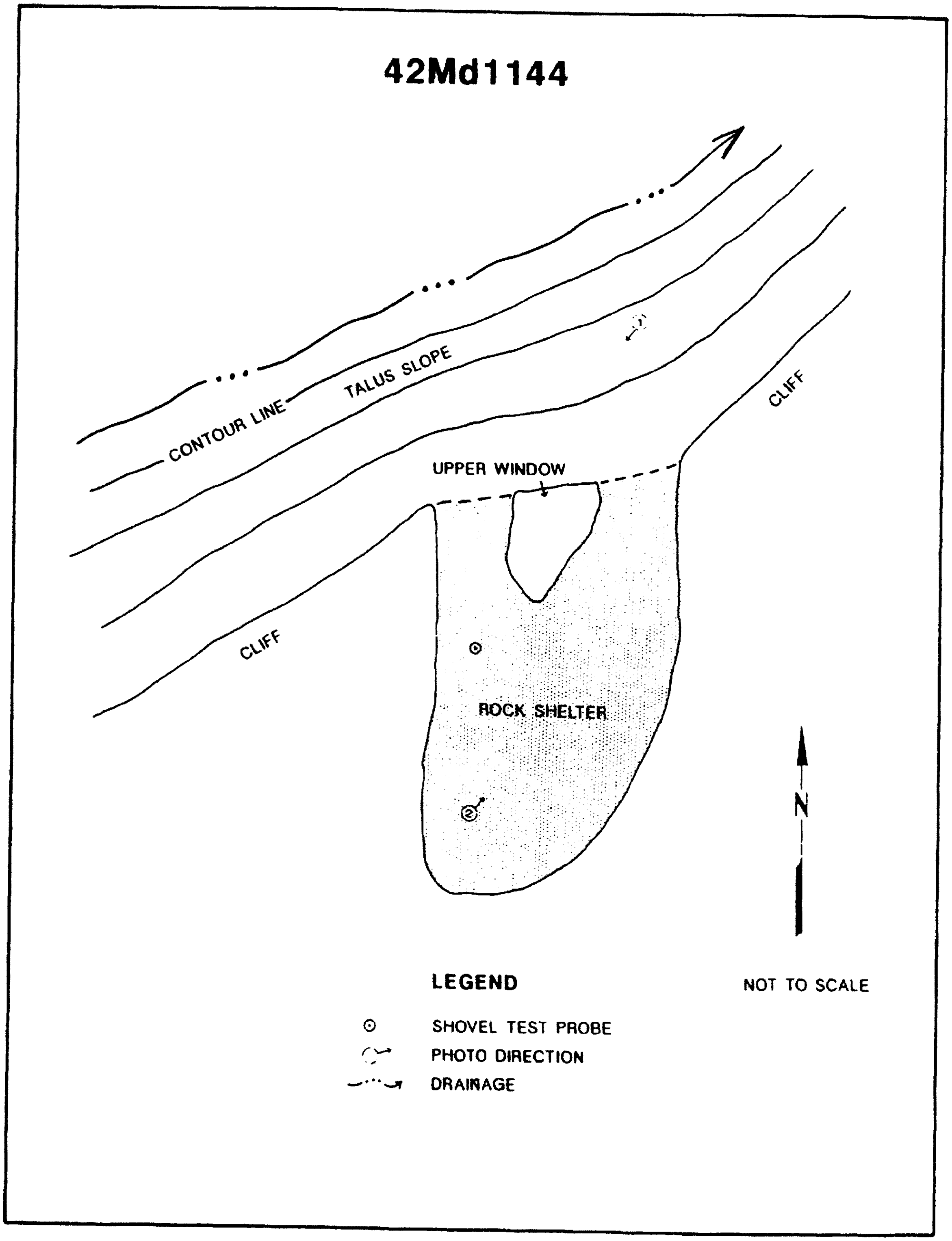

Figure 37. 42Md1144 location map.

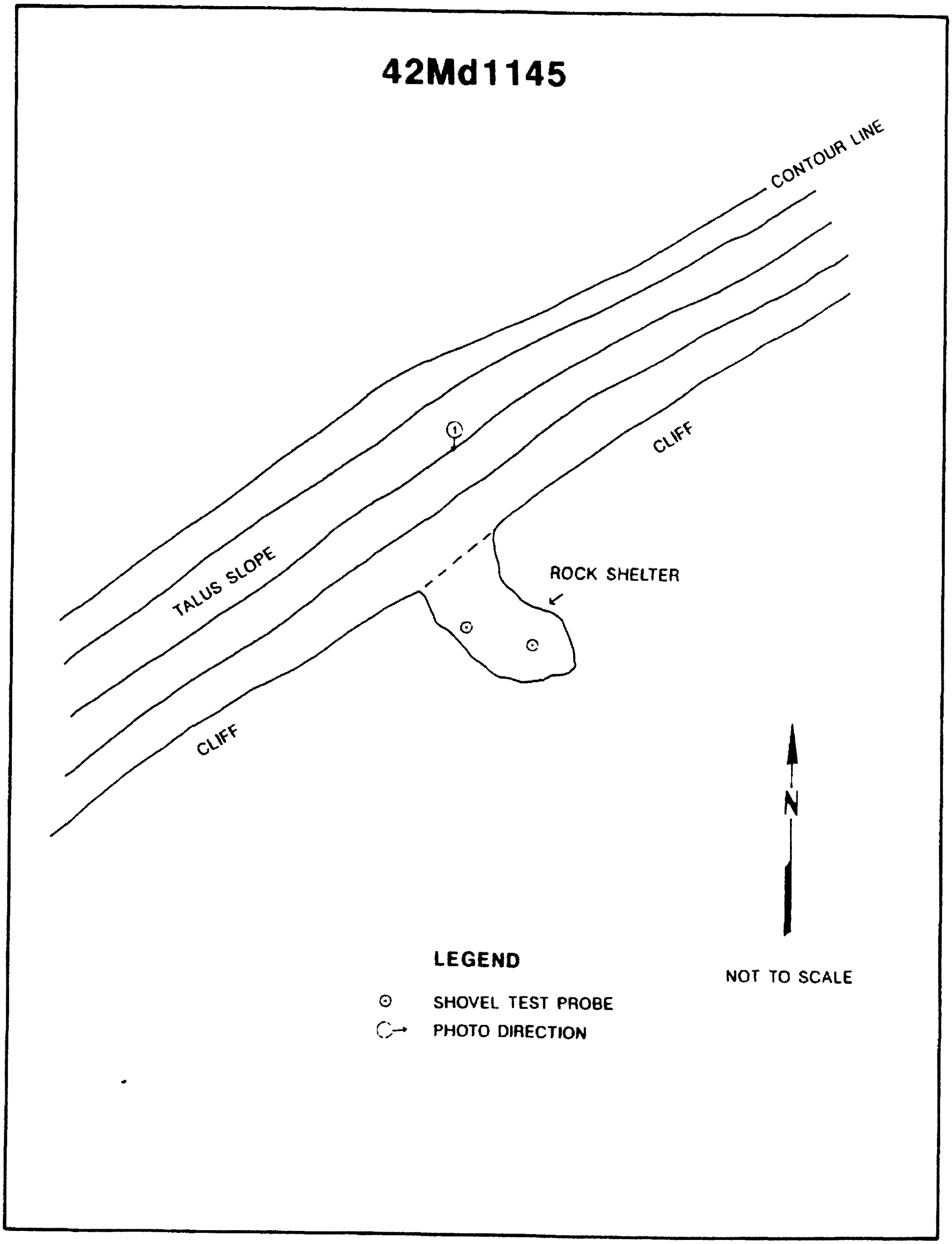

Figure 38. 42Md1145 location map.

of the rear of the cave to further ascertain the nature of the deposits. The northeast corner of the probe is 30 cm from the east wall. This 25 x 25 x 40 cm probe revealed about 20 cm of predominantly packrat fecal and vegetal material above 20 cm of brown silt loam. Fresh rabbit bones are present in the upper portion and a dried lizard carcass and fresh distal tibia articulated with astragalus and calcaneus were also uncovered.

The lack of cultural materials, sterile test probes, and recent faunal bones indicate that the site is unlikely to yield any information concerning prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1146. In June 1994, ARCON described the site as a small cave with a opening of about 1 x 1.1 m and 3.30 m deep (Norman 1994b) (Figure 39). No cultural remains were observed on the surface during the ARCON visit. WCRM reevaluated the site on September 20, 1996, and did not observe any cultural remains on the surface. The surface sediment consists of a loose mixture of vegetal, faunal, and fecal materials. One 25 x 30 cm deep probe was excavated to bedrock at 20 cm below the surface. Sediment exposed in the probe consists of predominantly non-stratified packrat midden matrix, including fecal material, twigs, wood, limestone fragments, eggshell, and medium-sized vertebrate bones that appear modern. No cultural materials were observed.

The lack of cultural materials, a sterile test probe, and non-stratified sediment indicate that the site is unlikely to yield any information concerning prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1147. This site was originally recorded as a prehistoric rock shelter by ARCON in June 1994 (Norman 1994b). The 3 m deep, 1 m wide, and 1 m high shelter consisted of a cave with two entrances and was filled with a large packrat midden.

WCRM reevaluated the site in September 1996 by digging two shovel probes in the shelter. The probes, which began 45 cm from the west wall, were placed side by side and extended from .60 to 1.0 m into the cave from the dripline. Each probe was dug to 60 cm below the surface. The first 10 cm is loose packrat midden material consisting of green juniper needles, cactus spines, and silt. The next 20 to 25 cm is composed of cemented sediment with two strata. The upper strata is grayish sediment overlying a gray-white layer. The cement appears to be calcium, marking the beginnings of tufa or travertine. The gray upper layer may be ash because some chunks of the consolidated sediment had small (3 to 4 cm diameter) pieces of charcoal. The cemented layer is over 30 cm of unconsolidated silt/clay with inclusions of limestone gravel to cobbles. A few pieces of burned bone were recovered from the screened fill of the probes. Among the burned bone were a proximal rib from a large mammal, a vertebrate spine from an medium-sized mammal, the femur from a small mammal, and a phalanx from a large adult mammal. Unburned bone consists of the phalanx from a juvenile artiodactyl, probably antelope, and the articular end of a long bone

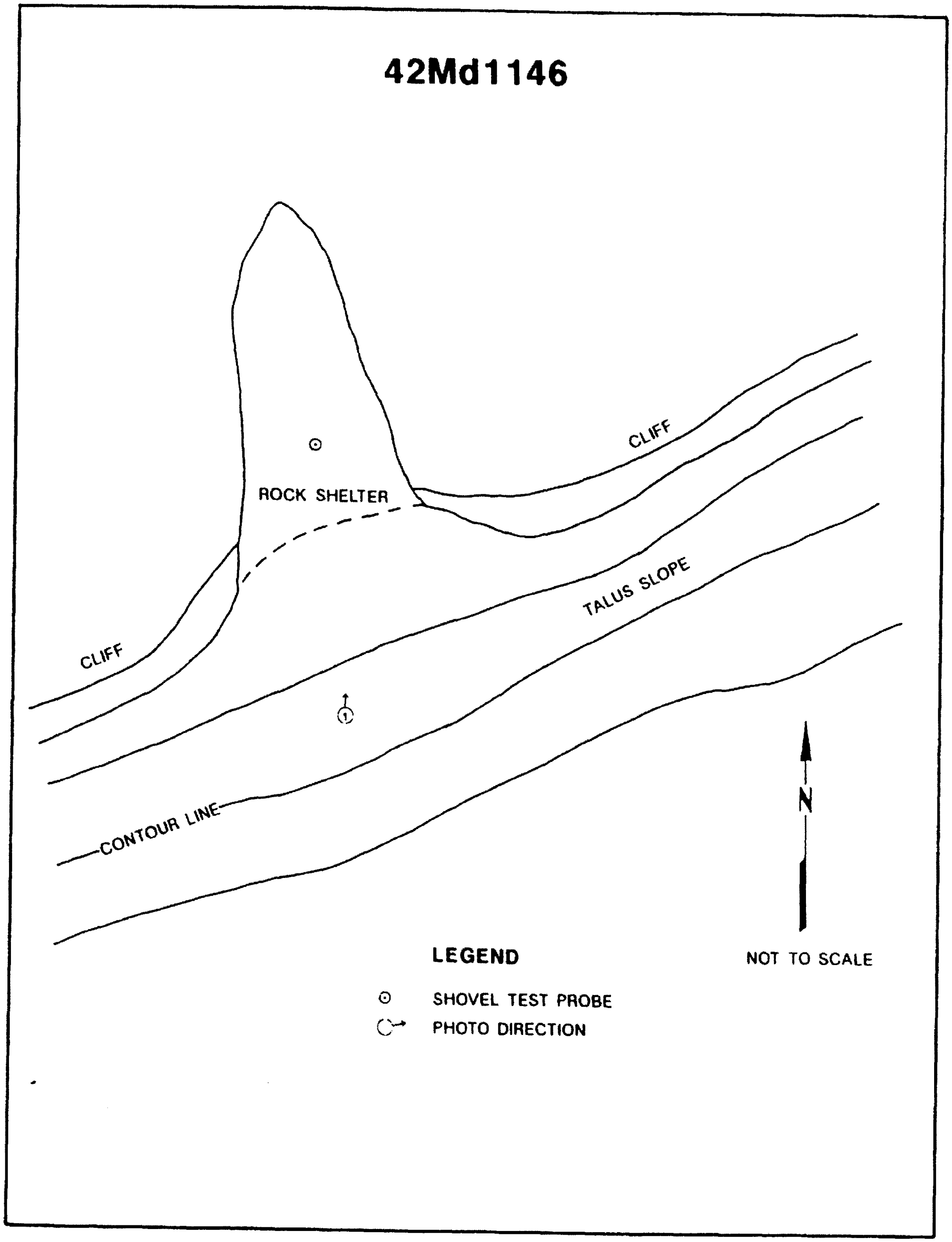

Figure 39. 42Md1146 location map.

from a medium to large juvenile mammal. The rib piece appeared to have been cut, but after microscopic examination it is still unclear whether or not the bone is cut. Even if the bone has been culturally modified, the cultural context is absent because the bone is not in situ. It was carried into the shelter from an unknown site location by packrats. Neither the charcoal and nor the rest of the bone appear to be cultural, although the burned bone may have originated at a nearby site and was transported by packrats. No artifacts were recovered from the probes or noted on the surface of the shelter.

The packrat midden, which covers the back of the shelter, has a fresh covering, indicated by green juniper needles. The roof of the shelter is shiny black, which suggests packrat and water staining rather than smoke.

Based on the slope and small size of the cave, the active nature of the packrat midden, and the lack of cultural material, the site does not have the potential to provide information pertinent to the prehistory of the area. The location lacks evidence of any cultural material or behavior; it cannot be considered a site.

Site 42Md1149. The site, which had been previously described by ARCON during a June 16, 1994 visit (Norman 1994b), was reevaluated by WCRM on September 21, 1996. The shelter opening faces 215 degrees and is 1.29 m high and 3.0 m wide (Figure 40). The back of the shelter to the dripline is 1.26 m. ARCON had observed burned bone and apparent smoke-blackening, but no definite cultural material. No cultural remains were observed during the reevaluation. The surface sediment consists of a mixture of predominantly vegetal and fecal materials. The blackening of the roof is thought to be water-deposited minerals and not smoke.

Two 25 x 25 cm probes were placed within the small shelter and both probes reached a depth of about 60 cm. The stratigraphy exposed in probe one consists of a 10 cm layer of limestone gravel and cobbles over 5 cm of predominantly juniper bark and twigs over loose sediment and rock. Probe 1 uncovered a relatively large amount of vertebrate bone. Two rib fragments were submitted to the WCRM faunal analyst for identification. One fragment of a small rib was recovered and subsequently identified as a sheep to deer-sized mammal, a size that can include humans, so the possibility of the bone being human cannot be completely disregarded. Nevertheless, the context of the rib fragment in a packrat midden, the presence of numerous other bones from a variety of other species, and the absence of additional human bone indicate that this bone is probably not human, and that this shelter does not contain human remains.

Probe 2 was located adjacent to Probe 1 and uncovered similar stratigraphy. Recovered bones include a metapodial, two ribs, and scapula fragments from three different mammal species. The lack of cultural materials in the test probes indicate that the site is unlikely to yield any information concerning prehistoric lifeways in this part of the Great Basin. This location lacks evidence of any cultural material or behavior; it cannot be considered a site.

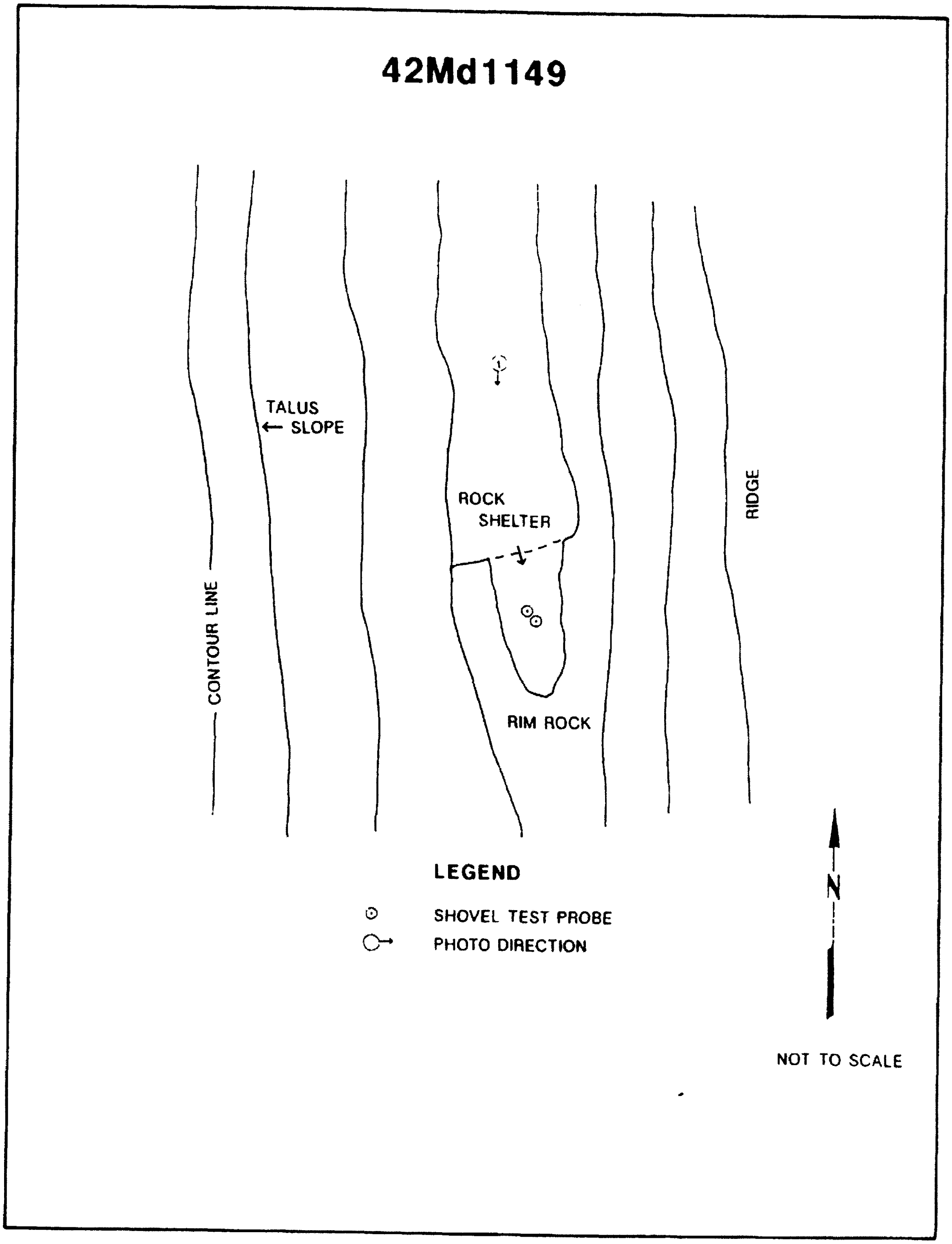

Figure 40. 42Md1149 location map.

ELIGIBILITY SUMMARY AND MANAGEMENT RECOMMENDATIONS

WCRM recommends that Continental Lime, Inc. be granted a cultural resources clearance for this project, with the following stipulations.

1. All mining and construction activities should be limited to the areas previously surveyed.

2. The seven newly recorded sites and two previously recorded sites (42Md1141 and 42Md1080) which are recommended for the NRHP be avoided during mining and construction activities. If avoidance is not possible a plan for mitigation and subsequent data recovery should be undertaken before work is allowed to proceed.

3. Mining and construction activities should be suspended and the BLM archaeologist be notified immediately if unrecorded cultural materials are encountered by mining and construction personnel.

Recommendation of No Adverse Effect

A recommendation of No Adverse Effect is proposed for the five prehistoric lithic scatters (42Md1080, 42Md1354, 42Md1355, 42Md1356, 42Md1357), 3 caves (42Md1141, 42Md1350, 42Md1358) and 1 multicomponent site (42Md1352) considered eligible for the NRHP pursuant to the implementation of the above steps.

Recommendation of No Effect/No Further Work

A recommendation of No Effect/No Further Work is proposed for the six prehistoric lithic scatters (42Md1116, 42Md1125, 42Md1139, 42Md1353, 42Md1359), 10 rock shelters/caves (42Md1123, 42Md1126, 42Md1127, 42Md1138, 42Md1140, 42Md1144, 42Md1145, 42Md1146, 42Md1147, 42Md1149), 1 multicomponent site (42Md1351), and 3 historic sites (42Md1142, 42Md1143, 42Md1185) pursuant to the implementation of the above steps.

In summary, mine expansion within tracts C, D, and E could adversely affect nine eligible sites. Data recovery is recommended to mitigate the effects of further mine development if the area of these nine sites cannot be avoided.

Table 6. Management Recommendations.

Site 42Md#	Site Type	NRHP Eligible	Management Recommendations
1080	Lithic scatter	Yes	No adverse effect Avoid or mitigate
1116	Not found	No	No effect/no further work Change legal location and site number to that of 42Md1125
1123	Rock shelter	No	No effect/no further work
1125	Lithic scatter	No	No effect/no further work
1126	Rock shelter	No	No effect/no further work
1127	Rock shelter	No	No effect/no further work Not a site, rescind site number
1138	Rock shelter	No	No effect/no further work Not a site, rescind site number
1139	Lithic scatter	No	No effect/no further work
1140	Rock shelter	No	No effect/no further work
1141	Cave	Yes	No adverse effect avoid or mitigate
1142	Historic tin can scatter	No	No effect/no further work
1143	Historic sheep camp	No	No effect/no further work
1144	Rock shelter	No	No effect/no further work Not a site, rescind site number
1145	Rock shelter	No	No effect/no further work Not a site, rescind site number
1146	Cave	No	No effect/no further work Not a site, rescind site number
1147	Rock shelter	No	No effect/no further work Not a site, rescind site number
1148	Lithic scatter	No	No effect/no further work
1149	Rock shelter	No	No effect/no further work Not a site, rescind site number

Table 6. Management Recommendations (cont.).

Site 42Md#	Site Type	NRHP Eligible	Management Recommendations
1150	Historic sheep camp	flagged	flagged to allow for exploratory drilling
1185	Seasonal camp	No	No effect/no further work
1350	Cave	Yes	No adverse effect Avoid or mitigate
1351	multicomponent	No	No effect/no further work
1352	multicomponent	Yes	No adverse effect Avoid or mitigate
1353	Lithic scatter	No	No effect/no further work
1354	Lithic scatter	Yes	No adverse effect Avoid or mitigate
1355	Lithic scatter	Yes	No adverse effect Avoid or mitigate
1356	Lithic scatter	Yes	No adverse effect Avoid or mitigate
1357	Lithic scatter	Yes	No adverse effect Avoid or mitigate
1358	Cave	Yes	No adverse effect Avoid or mitigate
1359	Lithic scatter	No	No effect/no further work

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WCRM

WESTERN CULTURAL RESOURCE MANAGEMENT, INC.

AUG 1 1997

July 29, 1997

Mr. Eric Kreusch, Archaeologist
Fillmore Resource Area
Bureau of Land Management
P.O. Box 778
Fillmore, Utah 84631

FILE
CM - PLAN OF OPERATIONS

Dear Eric,

Please find enclosed two copies of a negative report for a small cultural resource inventory conducted on parts of Tract C in the southern portion of the Cricket Mountain quarry area. We found only isolates, and no sites.

Also, I was at the Cricket Mountain Plant last week, and relocated 42Md1080 which is in Tract A. I found it some distance to the east of where it is recorded on the USGS. I will follow up with an amended site form to reflect its real location shortly. Importantly, I found the staked centerline of a proposed haul road, and there is a substantial buffer between the site and the proposed road as well as a deep arroyo, so there will be no direct impact from the road construction to this site.

Please let me know if you have an questions or comments.

Sincerely,

Charles W. Wheeler
Vice President

enc.

Cc: Steve Herron, SRK
Mike Brown, Continental Lime
Bob Robison, Continental Lime

ARIZONA 1721 WEST 10TH PLACE, SUITE 1A, TEMPE, AZ 85281 602 731-9092 FAX 602 731-9102
COLORADO 7765 DURHAM CIRCLE, P.O. BOX 2326, BOULDER, CO 80306 303 449-1151 FAX 303 530-7716
NEW MEXICO 1206 EAST MURRAY DRIVE, FARMINGTON, NM 87401 505 326-7420 FAX 505 324-1107
NEVADA 50 FREEPORT BLVD., SUITE 15, P.O. BOX 6130, SPARKS, NV 89432 702 358-9003 FAX 702 358-1387

Project Number: U97WE0392-b,f

U.S.
Department of the Interior
Bureau of Land Management
Utah State Office
Summary Report of
Inspection for Cultural Resources

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1. Report Title: Second Addendum to A Final Report of a Class III Inventory of the Cricket Mountain Quarry Expansion, 1996.

2. Development Company: Continental Lime, Inc.

3. Report Date: July 2, 1997 4. Inventory Date: June 4-7, 1997

5. Resource Area: House Range 6. County: Millard

7. Fieldwork Location: Map Reference: 7.5' USGS Candland Springs, Utah 1973

TWN 22S	Range 10W	Section(s) 10	N½ N½ NW¼ SE¼; S½ NW¼ SE¼;
TWN	Range	Section(s)	N½ N½ SW¼ SE¼; NE¼ NE¼ SE¼ SW¼
TWN	Range	Section(s)	E½ SE¼ NE¼ SW¼; SE¼ NE¼ NE¼ SW¼
TWN 22S	Range 10W	Section(s) 10	S½ NE¼ NE¼; SE¼ NE
TWN 22S	Range 10W	Section(s) 11	S½ NW¼ NW¼; NW¼ SW¼ NW¼
TWN	Range	Section(s)	W½ NE¼ SW¼ NW¼; SW¼ SW¼ NW¼
TWN 22S	Range 10W	Section(s) 3	S½ SE¼ NE¼; NE¼ SE¼

8. Description of Project Proposal: Continental Lime, Inc. requested an intensive cultural resource inventory of three areas proposed for mine expansion within previously designated Tract C.

9. Description of Examination Procedures: Two archaeologists from WCRM in Farmington, New Mexico walked a series of zigzag parallel transects spaced 20-30 m apart.

10. Linear Miles Surveyed: ________
and/or
Definable Acres Surveyed: 188.4 (BLM)
and/or
*Legally Undefinable Acres Survey: ________
(*A parcel hard to cadastrally locate, i.e., the center of a section)

11. Inventory Type: I
R = Reconnaissance
I = Intense
S = Statistical Sample

12. Description of Findings (attach appendices, if appropriate): The survey was conducted in three segments located in Tract C (Figure 1).

The first segment (Segment 1) in Tract C consists of 50.7 acres situated in a small east/west-trending valley bisected by a drainage. Ground cover of between 90 and 100 percent consists of mostly cheat grass, other grasses, and juniper at the west edge and especially on the west face of an outcrop. Low sagebrush and hedgehog and prickly pear cactus were also noted. Bedrock extrusions on slopes and clear patches of gravels are scattered throughout most of the area. Six packrat middens of varying sizes were identified in niches of a large outcrop located in the northwest portion of this segment. See continuation sheet.

13. Number Sites Found: None 14. Collection: None

15. Actual/Potential National Register Properties Affected: None

16. Literature Search, Location/Date: In September 1996, Charles W. Wheeler of WCRM conducted a literature search at the BLM office in Fillmore. Prior to beginning this project, Craig Harmon of the Richfield BLM office was consulted as to whether a new search was necessary. Because the only work undertaken in the project area since September 1996 was by WCRM, Mr. Harmon concluded that a new search was not necessary.

17. Conclusion/Recommendations: Based on the absence of sites or significant features, and on the paucity of artifacts, archaeological clearance is recommended for mine expansion in the three segments surveyed in Tract C.

Summary Report of
Inspection for Cultural Resources

Continuation Sheet

12. continued

Three evaporated milk cans and one tub were found in the segment. The tub, which was designated an isolated artifact (IA1), consists of an inverted metal wash tub with the bottom cut out. Soil is built up inside the tub and grass and a juniper remnant are present. It is not discernible if the soil was deliberately built up or is the result of several years of aggradation.

Segment 2 consists of 96.4 acres and is situated in a valley covered with mostly cheat grass. A sagebrush patch is present in a slightly rolling area in the northeast portion of the segment. A northeast-flowing drainage is present in the eastern part of the survey area. Ground cover varies from 70 to 100 percent. Gravel and anthill patches devoid of vegetation are scattered throughout the area. Some areas have matted grasses, or more often, dead cheat grass underlying new vegetation. Several overgrown two-track paths (most have not been used frequently enough or recently enough to be called roads) criss-cross the area.

Historic artifacts located in Segment 2 were widely scattered and consist of the following:

1 evaporated milk can in a drainage cutbank
1 hole-in-cap can
1 metal 5-gallon gas or solvent-type can in a drainage
2 solder dot top, punch opening cans
1 potted meat (Spam-type) can
1 beer bottle

In addition, three isolated prehistoric artifacts were found. One is a dull obsidian secondary flake with one utilized edge, found in the sagebrush patch (see Figure 1). The flake, which measures 35 x 30 x 30 mm, was designated IA2. IA3 is a Gypsum projectile point made of obsidian that measures 38 x 21 x 7 mm (Figure 2). IA4 is the midsection of an obsidian projectile point that measures 27 x 17 x 6 mm (see Figure 2). One side is heavily weathered. Both IA3 and IA4 were found in the gravel and anthill patches in an area of heavily matted, dead cheat grass (see Figure 1).

Segment 3 consists of 41.3 acres situated in a small north/south-trending valley that rises to the north. Two south-flowing drainages are in the eastern part of the segment and small north/south-trending rills were noted on the west side. Ground cover varies from 75 to 100 percent and is matted in places. Dead and new cheat grass, other grasses, and prickly pear cactus were noted. Sparse juniper and sagebrush were found on the west side of the segment. Large outcrops border each side of the valley, and boulders, and exposed patches of gravels and light brown loam extrude throughout the area. An overgrown two-track road trends north/south through the segment.

Along the east edge of the east portion of the segment three solder dot cans with hole punch openings and three pieces of white glazed ceramics were found. They may be associated with a 20 m x 3-5 m rock pile, but no other artifacts or evidence of cultural activity were found. A possible claim marker made of rocks with an upright tree branch in the middle was found 26 m west of the two-track road. Neither artifacts nor a claim was associated with the rock pile. The possible claim marker was designated an isolated feature (IF1; see Figure 1).

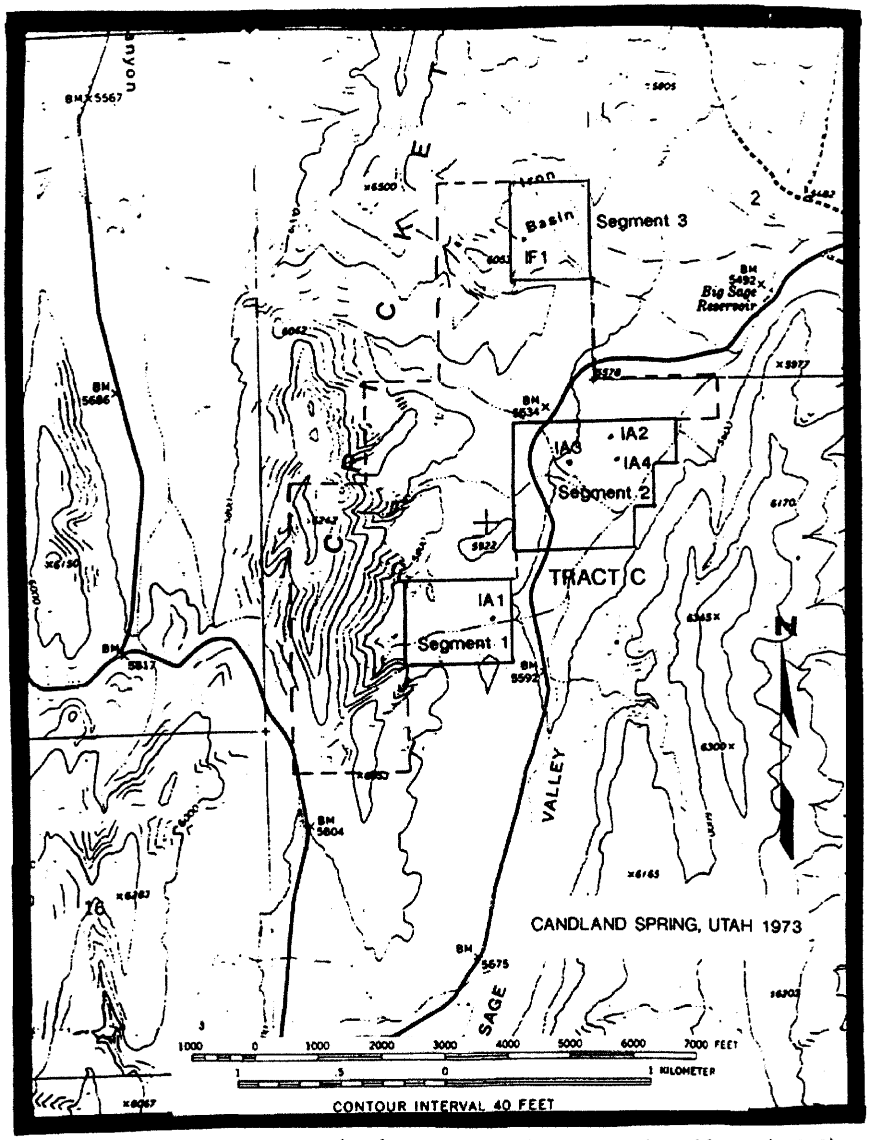

Figure 1. Surveyed segments (1-3) in Tract C with isolated artifacts (IA1-4) and isolated feature (F1).

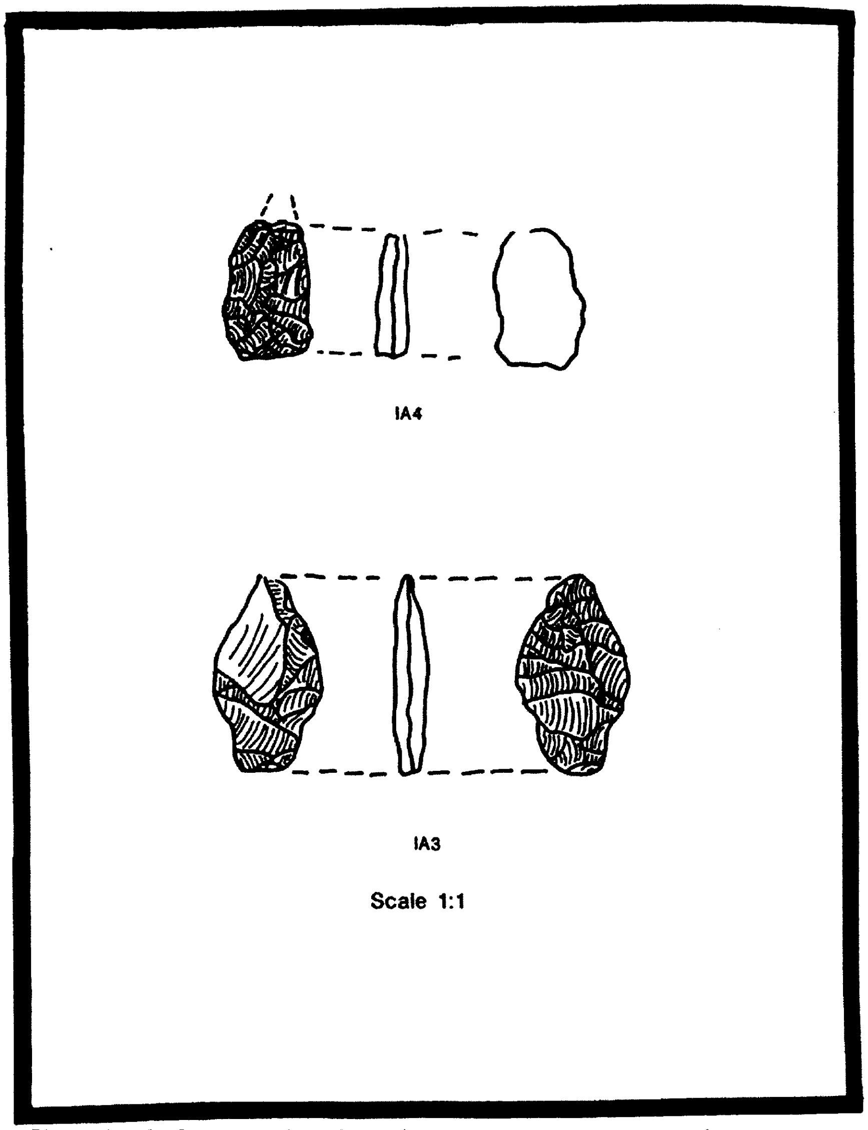

Figure 2. Isolated prehistoric artifacts identified in Segment 2.
IA3 is a Gypsum projectile point made of mahogany obsidian.
IA4 is the midsection of a mahogany obsidian projectile point.

Graymont Western U.S., Inc.
Cricket Mountain Project, Utah

Baseline Studies for the
Big Sage Valley and Allsop Quarry Projects

GRAYMONT

Graymont Western, U.S., Inc.
3950 South 700 East
Suite 301
Salt Lake City, Utah 84107

Prepared by:

SRK Consulting
Engineers and Scientists

Steffen Robertson and Kirsten (U.S.), Inc.
1250 Lamoille Highway, Suite 520
Elko, Nevada 89801

April 2007
SRK Project No. 138406

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**GRAYMONT WESTERN U.S., INC.
BIG SAGE VALLEY AND ALLSOP QUARRY PROJECTS
BASELINE REPORT
MILLARD COUNTY, UTAH**

1. INTRODUCTION

Graymont Western U.S., Inc. (Graymont) operates the Cricket Mountain Mine (Mine), an existing limestone mining and processing operation, located in west-central Utah (Figure1). The Mine consists of a limestone quarry, overburden stockpiles, screened undersize material stockpiles, haul roads, a processing plant, and ancillary facilities located on unpatented mining claims on public lands administered by the United States Department of the Interior, Bureau of Land Management (BLM), on lands leased from the State of Utah, and on private lands owned by Graymont. The general location is shown on Figure 1. The Mine received approval of its Plan of Operations from the Warm Springs Field Office in Fillmore, Utah. A Notice of Intention (NOI) for the existing Project was approved by State of Utah, Division of Oil, Gas and Mining (UDOGM) on January 1, 1981 (M/027/006). Additional NOIs have been subsequently filed.

The Mine is located approximately 32 miles southwest of the city of Delta, in Millard County, Utah. The Cricket Mountain Plant is located west of Highway 257 near Bloom Siding in Section 36, Township 21 South (T21S), Range 9 West (R9W) and Section 1, T22S, R9W. The existing limestone quarry can be reached by traveling six miles west of the Plant (Figure 2).

Graymont is developing plans to expand the East Allsop Quarry and to develop operations in Big Sage Area. The area of expansion of the East Allsop Quarry consists of portions of Sections 19, 30, and 31 of T21S, R9W, and Sections 24 and 25 of T21S, R10W. The Big Sage Area consists of portions of Sections 2, 3, 10, and 11 of T22S, R10W within the area of the U.S. Department of the Interior Geologic Survey (USGS) 7.5 minute series topographic map of the Candland Spring Quadrangle (Figure 3). The projects are detailed in the latest NOI (SRK 2007)

Elevations range from approximately 5,200 feet above mean sea level (amsl) to approximately 6,000 feet amsl. The area is characterized by valley bottom and foothills of higher mountain ranges. The foothills are dissected by several short drainages with steep side canyons and rock outcrops are common. Vegetation across this landform consists of native bunchgrasses, forbs, shrubs, and scattered juniper trees in the upper elevation foothills. A dense stand of cheatgrass (*Bromus tectorum*) occurs on the valley floors which have been previously burned. The cheatgrass has become a component of the herbaceous layer in some portions of the foothill vegetation that was not subject to recent fires.

SRK Consulting (SRK) was contracted to conduct baseline surveys of important resources on the subject land. The following resources were included in the survey:

- Special status species;
- Noxious and invasive plants species;
- Wildlife, including raptor nest sites; and
- Vegetation.

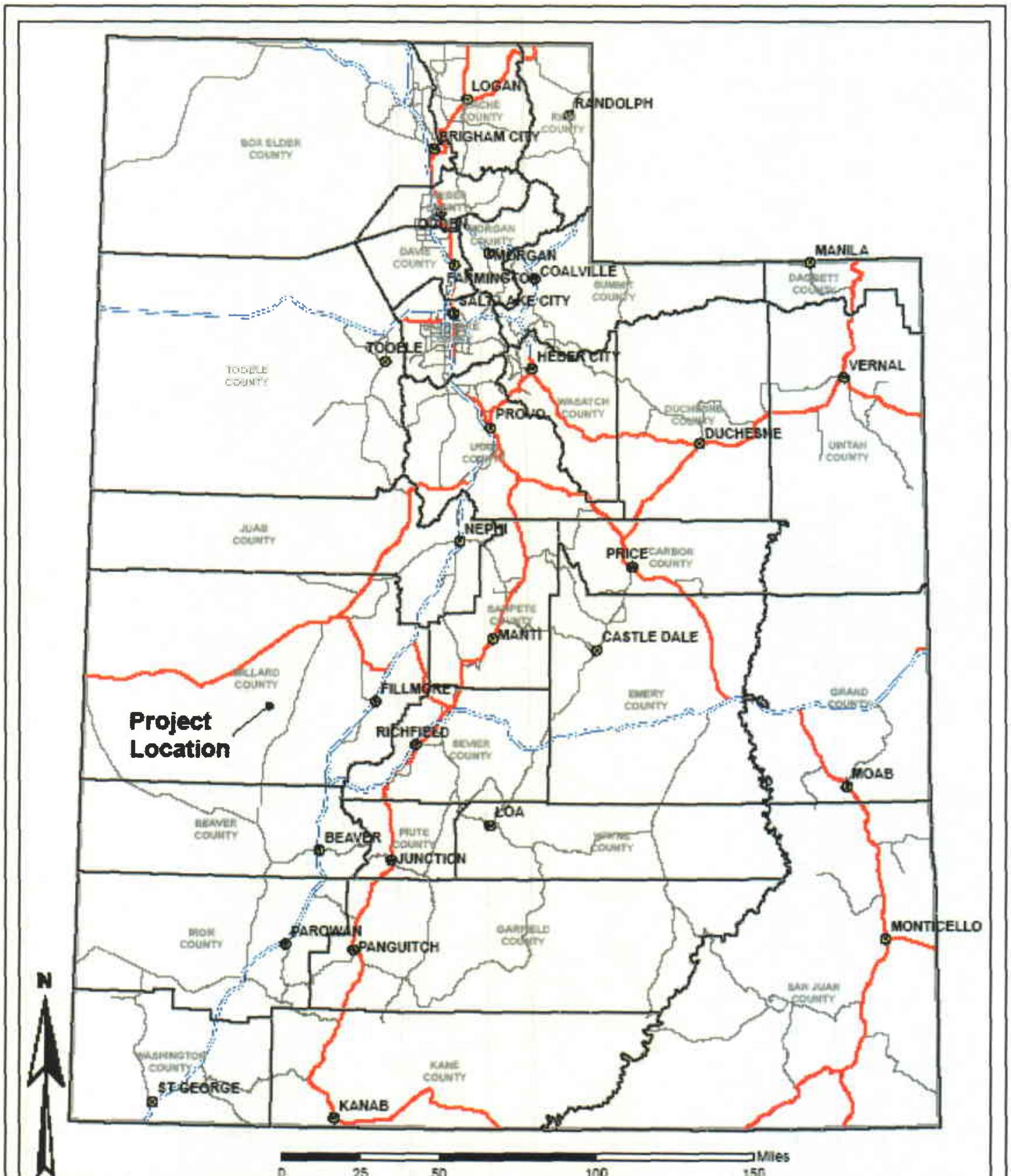
1.1. SURVEY METHODS

1.1.1. Special Status Species

SRK checked the Utah Natural Heritage Program website to determine which special status species had potential to occur on the subject lands. This information combined with previous surveys in the area, indicated that the only species of concern were Western burrowing owls (*Athene cunicularia* ssp. *hypugaea*) and ferruginous hawks (*Buteo regalis*). The field surveys consisted of traversing the subject land to determine if any nest sites for these two species were present. In addition, the lands were searched with binoculars throughout the day to determine if either species was present during the survey.

1.1.2. Noxious and Invasive Plant Species

Due to the previous disturbance in the area, the potential existed for non-native, invasive plant species to be present. SRK conducted a field survey of the subject lands to determine if any noxious and invasive plant species were present. The survey consisted of traversing the property to identify emerging plants and remnants of last season's growth.



EXPLANATION				FIGURE 1
City	DESIGNED	GNS	03/20/07	GRAYMONT WESTERN U.S., INC
Limited Access	DRAWN	RSS	03/20/07	CRICKET MOUNTAIN PROJECT
Highway	CHECKED			MILLARD COUNTY, UTAH
Major Road	APPROVED			LOCATION MAP
	REVISED			
	REVISED			

SRK Consulting Engineers and Scientists

SCALE:	AS SHOWN	REVISION
JOB NO:	000000	A
MAP NAME: Fig1_UT_Location_Map_RSS_20070320.mxd		

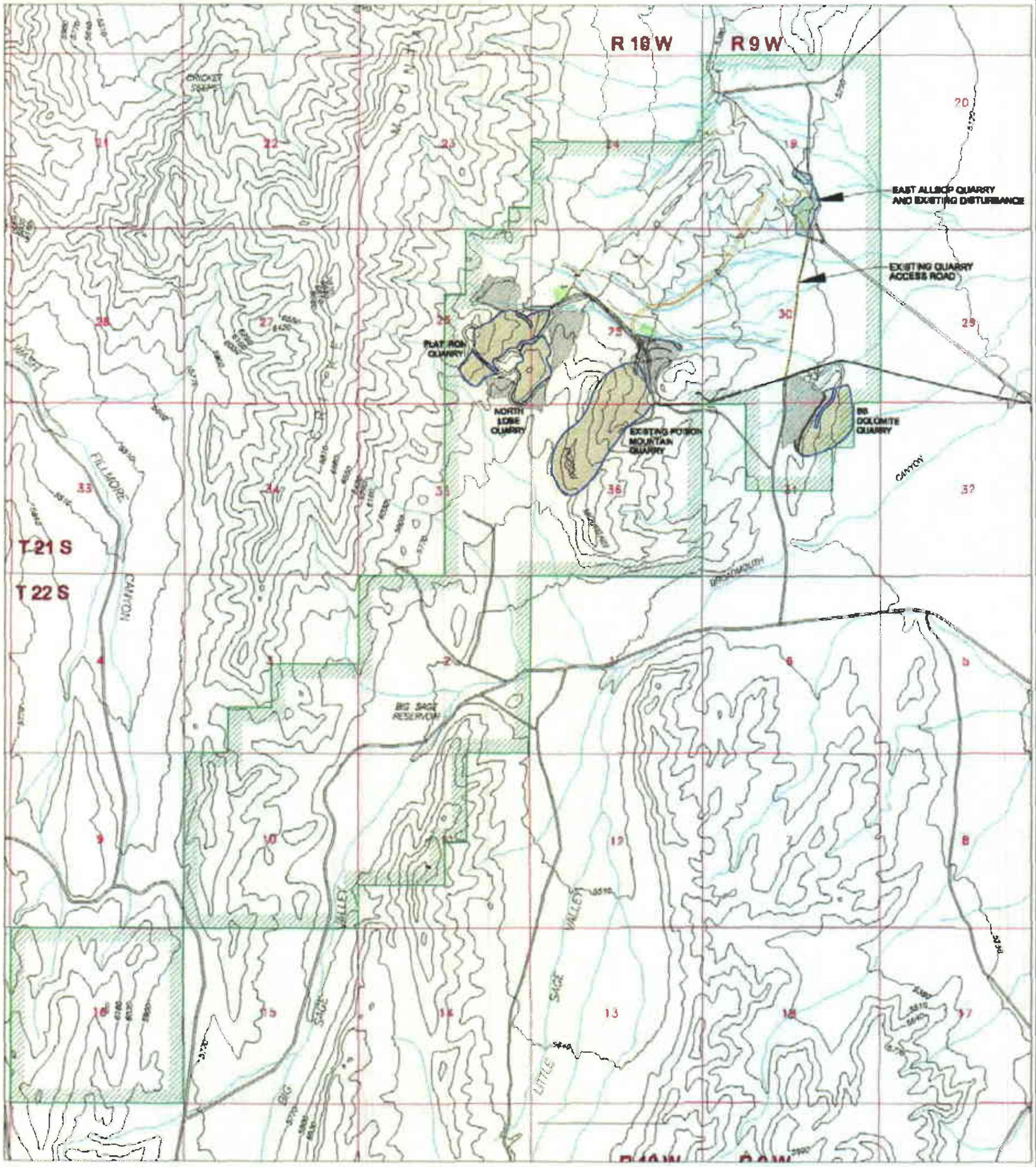
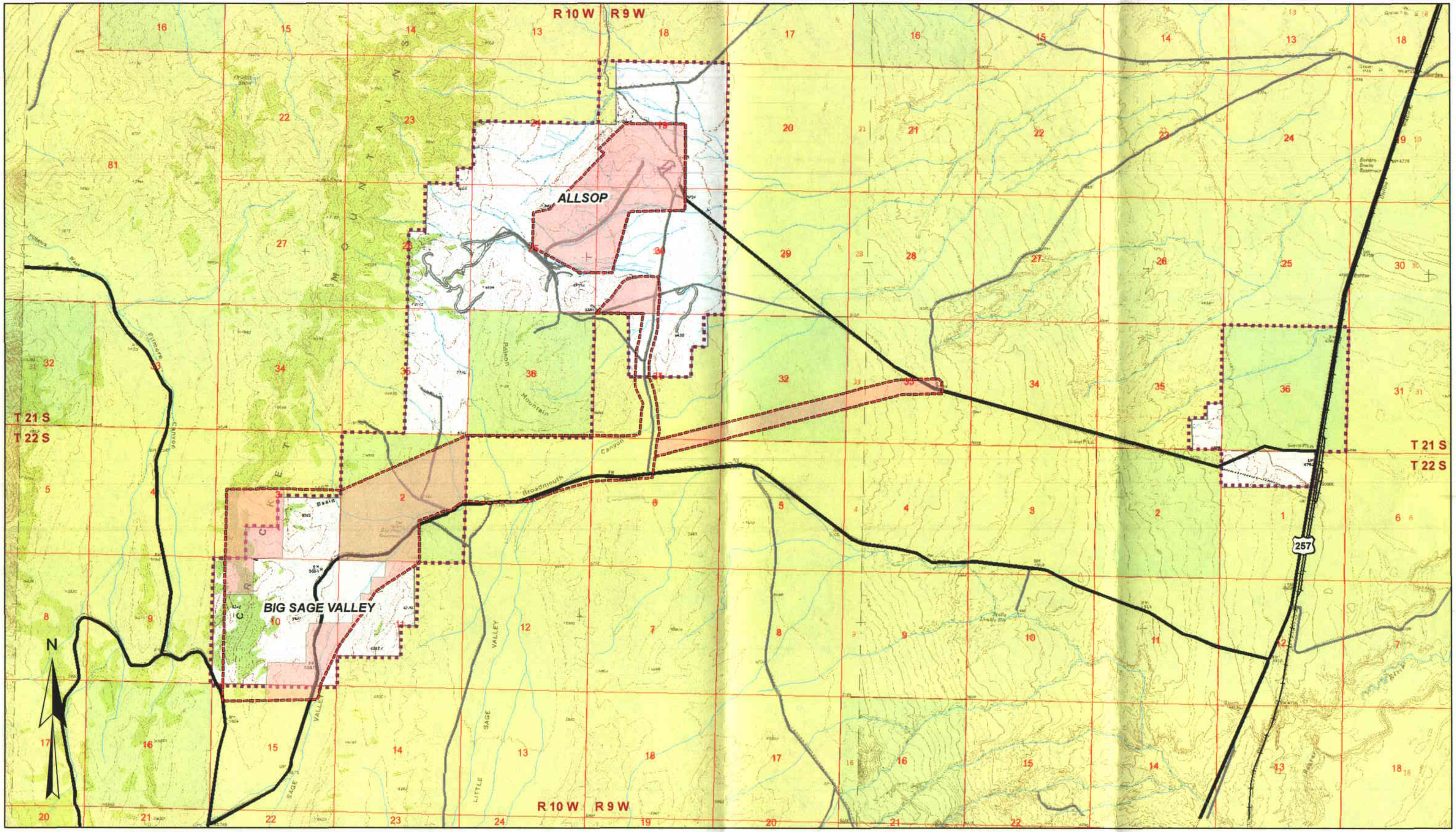


FIGURE 2: GRAYMONT WESTERN CRICKET MOUNTAIN

PROJECT EXISTING FACILITIES

SRK Consulting
Engineers and Scientists

DRAWING No.:	SHEET No. 1 OF 1
SCALE: 1"=1500'	
PROJECT No.: 138403	
DRAWING NAME: 138403-102	REVISION



PROPERTY BOUNDARY
Raptor Survey Areas
Baseline Study Areas

LAND OWNER
BLM
PRIVATE
STATE TRUST LAND

Feet
0 2,000 4,000 6,000
1 inch equals 3,750 feet OR 1:45,000

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

SRK Consulting
Engineers and Scientists

DESIGN:	GNB	DRAWN:	RSS	REVIEWED:	
CHECKED:		APPROVED:		DATE:	04/25/07

FILE NAME: Baseln_Fig3_Project_Area_RSS_20070425.mxd

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
PROJECT AREA

DRAWING TITLE:

DRAWING NAME: Figure 3

SRK JOB NO. 138406

REVISION NO. A

Path: G:\Sites\Cricket_Mountain\Graymont_Western\138406_000_ALLSOP_BIGSAGE_BASELINE\Baseln_Fig3_Project_Area_RSS_20070425.mxd

1.1.3. Wildlife

The area was surveyed for observation of wildlife species and/or their sign to determine which species are likely to inhabit the subject lands. Of particular interest were potential raptor nesting habitat, such as rock outcrops/ledges, juniper trees, ground nesting sites, and burrows.

1.1.4. Vegetation

The vegetation or plant communities were determined during the site visit. The dominant plant method was used to describe the various plant communities. Disturbed and undisturbed areas were field mapped.

As part of the baseline reference for reclamation activities, point-intercept transects were established n the subject lands. Transects were placed parallel to the contour and spaced throughout the subject lands to sample the various plant communities.

2. RESULTS

The field survey was conducted on April 17 and 18, 2007. SRK personnel were on site for approximately 23 man-hours. Weather during the survey varied from clear and warm to cool and windy.

2.1. Special Status Species

The BLM has designated a limited use area to protect ground nesting raptors, this area includes the Allsop Quarry, Flat Iron, and Poison Mountain Quarry sites, but does not extend into Big Sage Valley. This designation restricts motorized vehicle use to designated roads and trails from March 1 to June 30. Ferruginous hawk is the primary species afforded protection by this limited use designation.

During the on-site survey, two ferruginous hawk adults were observed on the site. Both individuals were hunting at the time of the observations. One was observed adjacent to the existing East Allsop Quarry in the black sagebrush – juniper vegetation type. Examination of the trees and shrubs in the area did not reveal any nest sites.

This species prefers to nest in isolated juniper trees or near the ground within the sagebrush. The juniper trees were examined and no nests were observed. No shrub nests were observed during the field work.

Burrowing owls nest in abandoned burrows created by other burrowing animals. The soils on much of the area were too shallow to bedrock to provide suitable habitat for this species. Areas of deeper soil generally had been subjected to wildfire and the vegetation suitable for burrowing owls was not present. Burrows observed during the survey did not reveal any active burrowing owl nests on the subject lands.

Several inactive stick nests were observed on the cliffs on the east side of Big Sage Valley. These nests did not have any fresh material to indicate use during 2007. These cliffs provide potential nest habitat for golden eagles (*Haliaeetus leucocephalus*) and prairie falcons (*Falco mexicanus*), but neither species was observed during the survey.

Bat roosting habitat in the form of caves was not observed within the subject lands. The limestone cliffs and rock outcrops along the east side of Big Sage Valley had several caves in the exposed rock cliff/rock outcrop areas which provide potential bat habitat. These cliffs and caves are not scheduled for disturbance, and the caves were not examined for depth, air flow, or other factors that make them suitable as bat habitat as they were out of the survey area. The lack of water on the subject lands reduces the variety of foraging habitat for bats, as does the abundance of cheatgrass in the valleys.

No special status species of plants were observed on the subject lands during the field survey. Most of the area has been previously burned and converted to cheatgrass, including areas of cheatgrass monoculture. These areas that have converted to cheatgrass have lost most of the native vegetation and special status plants were not anticipated or found in these areas. The remaining unburned vegetation did not include any special status plants.

2.2. Noxious and Invasive Plant Species

Noxious weeds were not observed during the site survey. A native, white-flowered thistle, probably Platte thistle (*Cirsium canescens*), was found scattered throughout the site but did not form patches where other species were excluded. This is a native thistle and exists as part of the disturbance regime of the west desert.

Cheatgrass, an invasive species, was common throughout the area and dominated the valley bottoms. These areas had burned with almost complete removal of the big sagebrush community. The scarcity of perennial grasses and forbs in these previously burned areas was indicative that the fire intensity was high. The salt desert shrub communities that were interspersed with the big sagebrush plant community had lower fuel loading, and survived as islands of desert shrub within the sea of cheatgrass. However, the cheatgrass has also invaded these islands and they now have sufficient fine fuel to sustain a fire and remove the salt desert shrub species.

2.3. WILDLIFE

Species or their sign that were observed during the site visit included common raven (*Corvus corax*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophilia alpestris*), meadowlark (*Sturnella neglecta*), flycatcher (*Expidonax* sp.), mourning dove (*Steptopelis decipiens*), loggerhead shrike (*Lanius ludovicianus*), coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), mountain cottontail (*Sylvilagus nuttallii*), whitetail antelope squirrel, (*Ammospermophilus leucurus*), pronghorn antelope (*Antilocapra americana*), sagebrush lizard (*Sceloporus graciosus*), horned toad (*Phrynosoma sp.*), and striped whipsnake (*Masticophis taeniatus*). Several other lizards were observed on site but were not identified to species.

No live waters were observed on the site, limiting the use of the area by most wildlife species.

2.4. VEGETATION

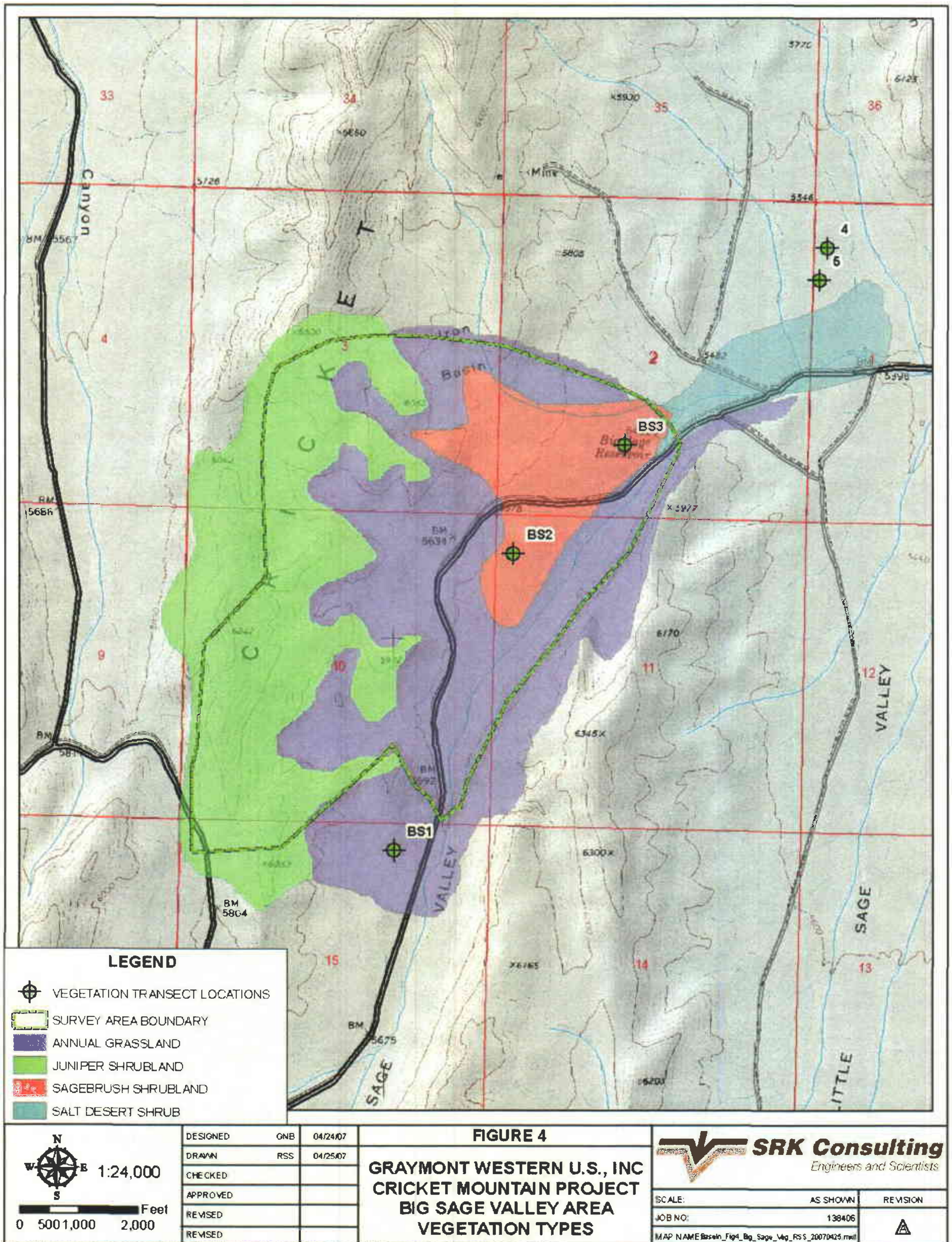
Four major plant communities occurred on site (Figures 4 and 5). The higher elevation sites in the foothills and along ridge tops were primarily a mixture of black sagebrush (*Artemisia nova*) and bluebunch wheatgrass (*Pseudoroegneria spicata*), but the cover ratio between these two species varied depending on the actual site (Table 1). North-facing slopes tended to have more grass dominance and the drier south- and west-facing slopes were dominated by shrubs, as were the ridge tops. The average perennial cover for this plant community was 29 percent, with a range of 20 to 38 percent. Utah juniper (*Juniperus osteosperma*) and bitterbrush (*Purshia tridentate)* were widely scattered within this type. Galleta-grass (*Pleuraphis jamesii*) was also observed in this community on the drier sites.

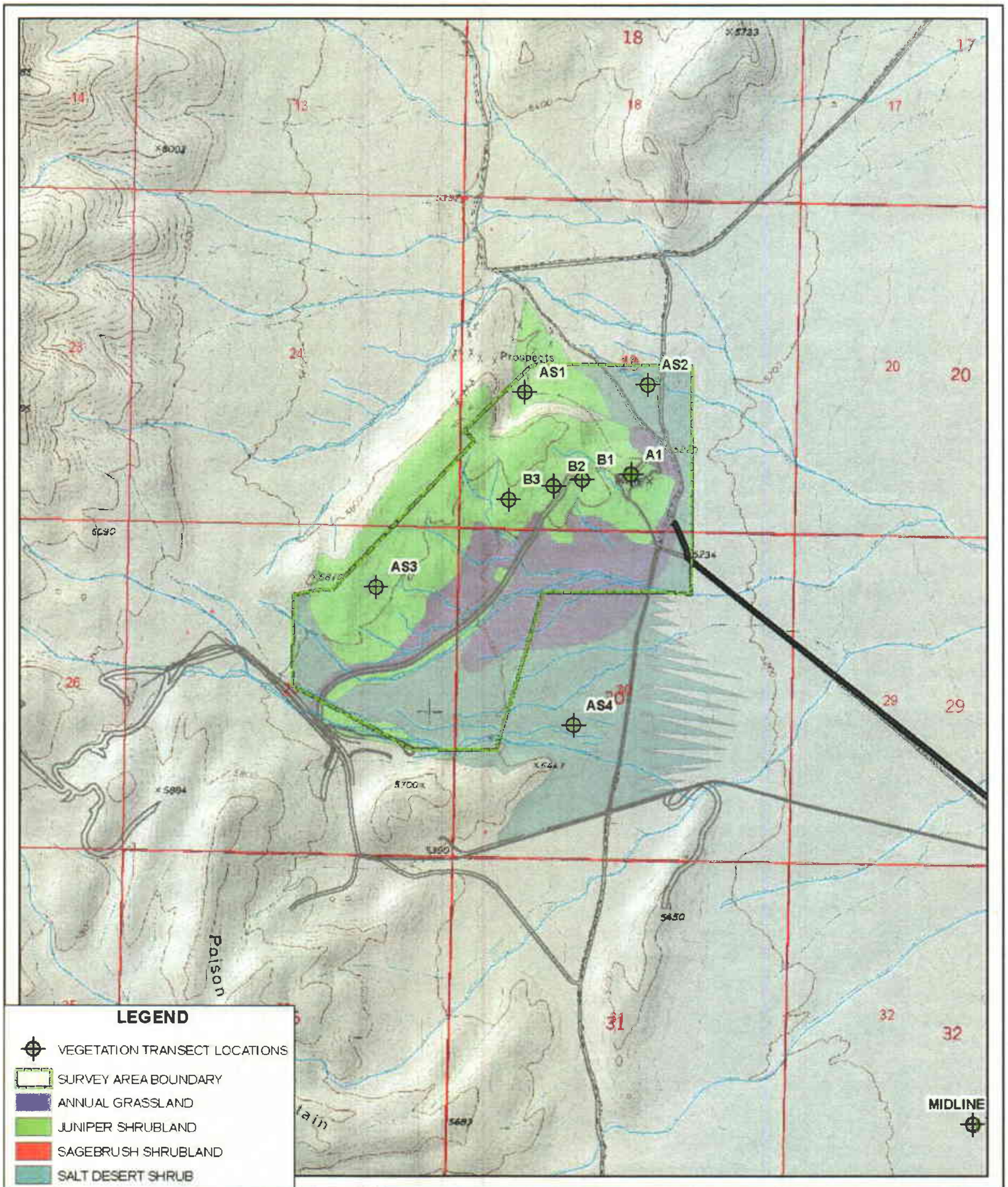
Two plant communities in the areas of the valley floor that were not burned consisted of a salt desert shrub community (Table 2) and a big sagebrush community (Table 3). The salt desert shrub community was invaded by cheatgrass. Shadscale (*Atriplex confortifolia*) was the dominant shrub in this community bottlebrush squirreltail (*Elymus elymoides*) was the dominant perennial grass in this community, but Indian ricegrass (*Achnatherum hymenoides*) was observed widely scattered in this community and galleta-grass occurred in patches. Winterfat (*Krascheninnikovia lanata*), bud sagebrush (*Artemisia spinescens*), Mormon tea (*Ephedra viridis*) and black sagebrush were also observed in this community. The average perennial cover for this plant community was 14 percent, with a range of 10 to 18 percent. Without the cheatgrass, this plant community does not have sufficient fuel to sustain a fire without exceptionally high winds. With the cheatgrass the average plant cover in these six transects was 40.3 percent and a fire could easily be sustained under these conditions. This type was found at the unburned base of the hills in the Allsop Quarry area, the area of Broadmouth Canyon, and along the proposed haul road route.

The big sagebrush community consisted primarily of big sagebrush, black sagebrush, and Indian ricegrass. Most of the Big Sage Valley consisted of this type prior to being burned. The average perennial cover for this plant community was 29 percent, with a range of 27 to 30 percent. Cheatgrass, although present, was a minor component of this community.

The forth plant community was the annual grassland or cheatgrass community (Table 4). This type was dominated by cheatgrass, which accounted for an average of 53 percent cover. Other perennial grasses occurred in these burned areas, but they were widely scattered and contributed 12 percent of the total cover. Indian ricegrass, bottlebrush squirreltail, bluegrass (*Poa secunda*), and galleta-grass were the perennial grasses found in this altered plant community. The fuel continuity in this community was continuous. The potential for fire in this community is high, and this plant community has contact zones with the other plant communities. Consequently, the entire survey area is at risk for wildfire.

A list of the species observed on the subject lands during the survey is included in Table 5.


Canyon
BS1
BS2
BS3
SAGE
VALLEY
LITTLE
SAGE
VALLEY
LEGEND
VEGETATION TRANSECT LOCATIONS
SURVEY AREA BOUNDARY
ANNUAL GRASSLAND
JUNIPER SHRUBLAND
SAGEBRUSH SHRUBLAND
SALT DESERT SHRUB
N
W
E
S
1:24,000
0 500 1,000 2,000
Feet
DESIGNED GNB 04/24/07
DRAWN RSS 04/25/07
CHECKED
APPROVED
REVISED
REVISED
FIGURE 4
GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
BIG SAGE VALLEY AREA
VEGETATION TYPES
SRK Consulting
Engineers and Scientists
SCALE: AS SHOWN
JOB NO: 138406
REVISION
MAP NAME Basin_Fig4_Big_Sage_Veg_RSS_20070425.mxd



DESIGNED	GNB	04/24/07
DRAWN	RSS	04/25/07
CHECKED		
APPROVED		
REVISED		
REVISED		

FIGURE 5

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
EAST ALLSOP QUARRY AREA
SOIL ASSOCIATIONS

SRK Consulting
Engineers and Scientists

SCALE:	AS SHOWN	REVISION
JOB NO:	138406	A

Table 1: Cover Estimate for Black Sagebrush-Bluebunch Wheatgrass Community

GROUND COVER	TRANSECTS					
	AS-1	AS-3	A-1[1]	B-1[1]	B-2[1]	B-3[1]	AVG
Bare Ground	20	28	62[2]	56[2]	63[2]	66[2]	49.2
Litter	9	21	0	0	0	0	5
Rock	11	20	0	0	0	0	5.2
Subtotal	**40**	**69**	**62**	**56**	**63**	**66**	**59.4**
			Grasses				
Indian Ricegrass	1	4	0	0	0	0	0.8
Cheatgrass	18	10	7	13	3	8	9.8
Bluegrass	8	2	0	0	1	2	2.2
Galleta-grass	0	1	10	2	0	3	2.7
Needleandthread	0	0	7	5	4	0	2.7
Bluebunch Wheatgrass	0	0	3	1	1	0	0.8
Subtotal	**27**	**17**	**27**	**21**	**9**	**13**	**19.0**
			Forbs				
Bur Buttercup	1	0	0	0	0	0	0.2
Globemallow	1	0	0	0	0	0	0.2
Stork's bill	1	0	0	0	0	0	0.2
Mustard	0	0	2	4	1	0	1.2
Phlox	0	1	0	0	0	0	0.2
Goldenweed	0	0	0	1	0	0	0.2
Allium	0	0	0	0	0	1	0.2
Unknown	2	1	0	0	0	0	0.5
Subtotal	**5**	**2**	**2**	**5**	**1**	**1**	**2.7**
			Shrubs				
Black Sagebrush	24	8	0	4	11	13	10.0
Shadscale	3	0	0	0	0	1	0.7
Rabbitbrush	1	2	5	1	5	2	2.7
Mormon tea	0	0	4	6	5	0	2.5
Spiny Hopsage	0	2	0	0	0	0	0.3
Horsebrush	0	0	0	2	5	4	1.8
Curleaf Mountain Mahogany	0	0	0	3	0	0	0.5
Subtotal	**28**	**12**	**9**	**16**	**26**	**20**	**18.5**
			Totals				
Total Cover	**60**	**31**	**38**	**44**	**37**	**34**	**40.1**
Perennial Cover	**38**	**20**	**29**	**27**	**33**	**26**	**28.8**

Other species located in the area include: Budsage, Tetradymia, juniper, Indian paintbrush, bitterbrush, vetch, barrel and prickly pear cactus, spiny hopsage, and cryptantha.

[1]Data collected in 2004.

[2]Bare Ground, litter, and rocks were recorded as one entry.

Table 2: Cover Estimate for the Salt Desert Shrub Community

GROUND COVER	TRANSECTS					
	AS-2	**AS-4**	**3[1]**	**4[1]**	**6[1]**	**7[1]**	**AVG**
Bare Ground	46	22	36	43	74	40	43.5
Litter	11	36	5	9	5	18	14.0
Rock	4	7	0	0	1	1	2.2
Subtotal	**61**	**65**	**41**	**52**	**80**	**59**	**59.7**
Grasses							
Indian ricegrass	0	5	0	0	0	0	0.8
Squirreltail	0	2	6	0	0	5	2.2
Cheatgrass	21	16	45	35	2	25	24.0
Bluegrass	0	0	0	0	0	1	0.2
Galleta-grass	1	0	0	0	0	0	0.2
Subtotal	**22**	**23**	**51**	**35**	**2**	**31**	**27.3**
Forbs							
Bur Buttercup	7	0	0	0	0	0	1.2
Stork	0	9	0	0	0	0	1.5
Subtotal	**7**	**9**	**0**	**0**	**0**	**0**	**2.7**
Shrubs							
Black Sagebrush	5	0	0	0	9	0	2.3
Shadscale	1	2	7	7	1	7	4.2
Rabbitbrush	0	1	0	3	6	1	1.8
Mormon tea	4	0	0	0	0	0	0.7
Winterfat	0	0	0	0	2	1	0.5
Bud Sagebrush	0	0	1	3	0	1	0.8
Subtotal	**10**	**3**	**8**	**13**	**18**	**10**	**10.3**
Totals							
Total Cover	**39**	**35**	**59**	**48**	**20**	**41**	**40.3**
Perennial Cover	**11**	**10**	**14**	**13**	**18**	**16**	**13.7**

Other species located in the area include: Budsage, Tetradymia, juniper, Indian paintbrush, bitterbrush, vetch, barrel and prickly pear cactus, spiny hopsage, and cryptantha.
[1]Data collected in 2006.

Table 3: Cover Estimate for the Big Sagebrush Community

GROUND COVER	TRANSECTS		
	BS-2	**BS-3**	AVG
Bare Ground	40	41	40.5
Litter	21	17	19.0
Rock	3	1	2.0
Subtotal	**64**	**59**	**61.5**
Grasses			
Indian ricegrass	0	12	6.0
Bottlebrush Squirreltail	0	5	2.5
Cheatgrass	1	4	2.5
Subtotal	**1**	**21**	**11.0**
Forbs			
Bur Buttercup	5	10	7.5
Subtotal	**5**	**10**	**7.5**
Shrubs			
Black Sagebrush	12	3	7.5
Shadscale	0	1	0.5
Rabbitbrush	0	1	0.5
Big Sagebrush	18	5	11.5
Subtotal	**30**	**10**	**20.0**
Totals			
Total Cover	**36**	**41**	**39**
Perennial Cover	**30**	**27**	**28.5**
Other species located in the area include: Bitterbrush, juniper, winterfat, budsage, galleta, prickly pear, tetra, and spiny hopsage.			

Table 4: Cover Estimate for the Annual Grassland Community

GROUND COVER	TRANSECTS			
	BS-1	2[1]	5[1]	AVG
Bare Ground	6	7	24	12.3
Litter	35	1	8	14.7
Rock	0	0	0	0.0
Subtotal	**41**	**8**	**32**	**27.0**
Grasses				
Indian ricegrass	37	0	0	12.3
Cheatgrass	1	92	66	53.0
Subtotal	**38**	**92**	**66**	**65.3**
Forbs				
Bur Buttercup	19	0	0	6.3
Kochia	2	0	0	0.7
Mustard	0	0	2	0.7
Subtotal	**21**	**0**	**2**	**7.6**
Shrubs				
Subtotal	**0**	**0**	**0**	**0**
Totals				
Total Cover	**59**	**92**	**68**	**73.0**
Perennial Cover	**37**	**0**	**0**	**12.3**
Other species located in the area include: Bitterbrush, juniper, winterfat, budsage, galleta, prickly pear, tetra, and spiny hopsage. [1]Data collected in 2006.				

Table 5: List of Plants Observed within the Project Area

SYMBOL	COMMON NAME	SCIENTIFIC NAME
	GRASSES	
PSSP	Bluebunch wheatgrass	*Pseudoroegneria spicata ssp. spicata*
BRTE	Cheatgrass	*Bromus tectorum*
ACHY	Indian ricegrass	*Achnatherum hymenoides*
POSE	Sandberg bluegrass	*Poa secunda*
ELEL	Bottlebrush squirreltail	*Elymus elymoides*
HECO	Needlegrass	*Hesperostipa comata ssp. comata*
PLJA	Galleta-grass	*Pleuraphis jamesii*
	FORBS	
DEPI	Tansymustard	*Descurainia pinnata*
HAST	Goldenweed	*Stenotus stenophyllus*
PHLOX	Phlox	*Phlox L.*
ERIGE	Erigeron	*Erigenia Nutt.*
ALLLI	Allium	*Allium sp.*
EROD	Stork's bill	*Erodium*
RATE	Bur buttercup	*Rannuculatus testiculatus*
KOPR	Kochia	*Kochia prostrata*
CAST	Indian paintbrush	*Castilleja*
CRYPT	Cryptantha	*Cryptantha*
	SHRUBS	
ARNO	Black sagebrush	*Artemisia nova*
ARSP	Bud sagebrush	*Artemisia spinescens*
ARTRV	Mountain big sagebrush	*Artemisia tridentata vaseyana*
ATCO	Shadscale	*Atriplex confertifolia*
CHVI	Douglas rabbitbrush	*Chrysothamnus viscidiflorus*
GRSP	Spiny hopsage	*Grayia spinosa*
EPVI	Mormon tea	*Ephedra viridis*
KRLA	Winterfat	*Krascheninnikovia lanata*
TETRA	Horsebrush	*Tetradymia*
JUNIP	Juniper	*Juniperus*
CELE	Curleaf Mountain Mahogany	*Cercocarpus ledifolius*
PURSH	Bitterbrush	*Purshia*
	CACTI	
OPUNT	Pricklypear	*Opuntia sp.*
ECHIN	Cactus	*Echincereus sp.*

3. RECOMMENDATIONS

3.1. Special Status Species

No modification of the proposed project is necessary with respect to special status species. No special status plant or animal species (or their sign) were observed during the survey.

3.2. Noxious and Invasive Plant Species

The area was free of noxious weeds, but cheatgrass was dominant in the valleys, a major component of the salt desert shrub community, and present in the upper elevation plant community. The salt desert shrub community is generally not considered to be prone to fire except under extreme conditions because of the large interspaces between plants (i.e., fuel discontinuity). However, the presence of cheatgrass in the interspaces has changed the fuel distribution such that this plant community is now susceptible to range fires under normal, late season conditions.

3.3. Wildlife

Removal of vegetation should be conducted between August 1 and March 30 to avoid possible violations of the Migratory Bird Treaty Act. This act prohibits the taking of migratory birds, their nests, eggs, or young. Therefore, all grubbing of all access roads, pit, and overburden sites should take place in the non-nesting season.

3.4. Vegetation

Graymont has had success with the seed mix used for reclamation of the Flat Iron Project and SRK recommends that this mix be used for reclamation of the Allsop and Big Sage Valley projects as well. Due to the amount of cheatgrass in the Project areas, the species in this mix are likely to establish, albeit in combination with cheatgrass. Use of the salvaged soil will provide a growth media suitable for these species. Other species may be added to the reclamation seed mix, but the species specified in the seed mix will provide the pre-mining land uses and stabilize the site following exploration.

4. REFERENCES

SRK Consulting (U.S.) Inc. (SRK). Baseline Studies for the East Allsop Quarry. Prepared for Graymont Western U.S., Inc. Elko, Nevada

SRK. 2006 Baseline Studies for the Cricket Mountain Dolomite Exploration Project. Prepared for Graymont Western U.S., Inc. Elko, Nevada

SRK. 2007 Notice of Intention to Amend Mining Operations Big Sage. Prepared for Graymont Western U.S., Inc. Elko, Nevada

APPENDIX A

2007 TRANSECT PHOTOS

Photo 1: Transect AS-1 in area of shallow soil; black sagebrush/bluebunch community.

Photo 2: Transect AS-2 in salt desert shrub community.

Photo 3: Transect AS-3 in black sagebrush/bluebunch Community.

Photo 4: Transect AS-4 in salt desert shrub Community with cheatgrass.

Photo 5: Transect BS-1 in annual grass community.

Photo 6: Transect BS-2 in big sagebrush community.

Photo 7: Transect BS_3 in big sagebrush community.

Soil Survey Report – Cricket Mountain Project

GRAYMONT

Report Prepared for

Graymont Western U.S., Inc.
Cricket Mountain Mine

Report Prepared by

SRK Consulting
Engineers and Scientists

March 2007

Soil Survey Report – Cricket Mountain Project

GRAYMONT

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SRK Project Number 138406

March 2007

Author: Gary N. Back

Reviewed by: Val Sawyer

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1 Introduction and Scope of Report

Graymont Western U.S., Inc. (Graymont) operates the Cricket Mountain Mine (Mine), an existing limestone mining and processing operation, located in west-central Utah. The Mine consists of a limestone quarry, overburden stockpiles, screened undersize material stockpiles, haul roads, a processing plant, and ancillary facilities located on unpatented mining claims on public lands administered by the United States Department of the Interior, Bureau of Land Management (BLM), on lands leased from the State of Utah, and on private lands owned by Graymont. The general location is shown on Figure 1. The Mine received approval of its Plan of Operations from the Warm Springs Field Office in Fillmore, Utah. A Notice of Intention (NOI) for the existing Project was approved by State of Utah, Division of Oil, Gas and Mining (UDOGM) on January 1, 1981 (M/027/006). Additional NOIs have been subsequently filed.

The Mine is located approximately 32 miles southwest of the city of Delta, in Millard County, Utah. The Cricket Mountain Plant is located west of Highway 257 near Bloom Siding in Section 36, Township 21 South (T21S), Range 9 West (R9W) and Section 1, T22S, R9W. The existing limestone quarry can be reached by traveling six miles west of the Plant (Figure 2).

Graymont is developing plans to expand the East Allsop Quarry and to develop operations in Big Sage Area. The area of expansion of the East Allsop Quarry consists of portions of Sections 19, 30, and 31 of T21S, R9W, and Sections 24 and 25 of T21S, R10W. The Big Sage Area consists of portions of Sections 2, 3, 10, and 11 of T22S, R10W within the area of the U.S. Department of the Interior Geologic Survey (USGS) 7.5 minute series topographic map of the Candland Spring Quadrangle (Figure 3).

Elevations range from approximately 5,200 feet above mean sea level (amsl) to approximately 6,200 feet amsl. The area is characterized by valley bottom and foothills of higher mountain ranges. The foothills are dissected by several short drainages with steep side canyons, and rock outcrops are common. Vegetation across this landform consists of native bunchgrasses, forbs, shrubs, and scattered juniper (*Juniperus osteosperma*) trees in the upper elevation foothills. A dense stand of cheatgrass (*Bromus tectorum*) occurs on the valley floors which have been previously burned. The cheatgrass has become a component of the herbaceous layer in some portions of the foothill vegetation that was not subject to recent fires.

SRK Consulting (SRK) was contracted to conduct soil surveys to determine if the soils present are suitable for use in reclamation. This report summarizes the findings of the soil survey.

deep-rooted plants organic matter and initiates or contributes to soil aggregate destabilization. Long lasting erosion can result in propagation of gullies, exposure of subsurface soils, and poor plant growth. Steep slopes do not allow for rapid water infiltration. Generally, soil profiles on steep slopes are shallow and poorly developed.

Gravel/Rock Fragments: Gravel and rock fragments reduce the water holding capacity of a soil in direct proportion to their volume. A soil containing 35 percent or more gravel three inches in diameter is considered excessive.

Restrictive Layers: Duripans are subsurface horizons densely packed or cemented by silica and create an impermeable layer. Duripans constrain plant growth and promote water runoff and erosion because rainwater cannot penetrate through the cemented material.

Calcic horizons contain accumulations of pedogenic (soil) carbonate. The amount of carbonate in a soil horizon determines the particular stage of calcium carbonate development: Stage I indicates the least amount of carbonate development (thin coatings on the undersides of gravel) while Stage V indicates the greatest amount of carbonate development (pure, cemented pedogenic carbonate) and can impede root growth and water infiltration. Stage I is the least restrictive while Stage V is the most restrictive.

pH: Soil pH, the measurement of soil acidity or alkalinity, influences nutrient availability and microorganism activity. Soil pH influences the types of vegetation that can survive within a particular soil. Tolerance to acid and/or alkaline conditions varies depending on plant species. Soils with a pH of 6.1-7.8 typically favor optimum plant growth because nutrients are readily available within this range. Soils with high pH values (7.8 or greater) contain elevated amounts of calcium and magnesium and insufficient amounts of iron, manganese, copper, zinc, phosphorus, and boron. Soils with low pH values (5.5 or below) contain low levels of calcium, magnesium, and phosphorus. Low pH levels increase the solubility and mobility of heavy metals such as aluminum and iron in soil. As solubility increases, heavy metals can more readily move downward with water through the soil column to aquifers and/or surface waters.

The preceding discussion is based on using soils *in situ* for rangeland seedings. However, in the context of mining, the soils will be salvaged and stockpiled for later use in reclamation. Therefore, soil depth is important with respect to the volume of soil that is available to be salvaged and later redistributed on the reclaimed facilities. Similarly, the restrictive layers affect *in situ* plant growth, but these layers would not be present in redistributed soils on reclaimed facilities. Consequently, soils rated as poor due to soil depth or presence of restrictive layers may be very suitable for use in reclamation.

3 Program Objectives and Work Program

3.1 Program Objectives

The purpose of the site visit with regard to soils was to generally verify unpublished NRCS soil survey information reviewed prior to the site visit, and to assess potential restrictive soil features that influence reclamation and erosion control efforts. Soil samples were collected to verify field observations.

3.2 Work program

Prior to conducting the site visit, SRK contacted the NRCS office in Richfield, Utah to obtain NRCS soil survey data. This data consisted of unpublished survey data which has not been verified by NRCS. Based on the soil map units provided by the NRCS, SRK selected random points for digging soil pits and collecting soil samples.

The soil survey was conducted on March 12 and 13, 2007. Thirteen soil samples were collected and 26 soil pits were prepared. The thirteen soil pits prepared from which soil samples were not collected were to help determine soil map unit boundaries. The soil pits consisted of excavating soil down to a restrictive layer (e.g., bedrock, duripan, or large cobble layer). The depth to the restrictive layer, vegetation at the site, and soil description were recorded. In areas that had been subject to wildfire, the preburn vegetation description was also included and was based on unburned islands in the vicinity of the pit.

The soil sample consisted of at least 800 grams of soil material. The sample material was obtained by taking a vertical "slice" of the pit wall from the surface to the bottom of the pit and placing the material in one-gallon zip-lock bags for transportation back to the soil lab. The samples were then weighed, dried in an oven and re-weighed to determine moisture content. The dried soils were then subjected to a sieve analysis, which determined the various sized materials in each sample.

Soil pH was not collected in the field. The vegetation at the sample sites was used as an indication of pH problems. Most plants are tolerant of pH values between 6.1 and 7.8. Outside of this range, the plant community shows significant changes in species composition (i.e., acid- or alkaline-tolerant species).

3.3 Project team

Field work and report preparation were conducted by Dr. Gary Back, SRK Principal Ecologist. Ms. Angel Nicholson, SRK Staff Biologist, summarized the unpublished soil survey information. Mr. Robert Howard, SRK Field Services Director, conducted the soil texture analysis. Figures were prepared by Mr. Ryan Shane, Range Consultant. Ms. Val Sawyer, SRK Principal, reviewed the report.

4 Program Results

4.1 East Allsop Quarry Area

4.1.1 NRCS Information

The NRCS unpublished soil survey included two soil associations for the East Allsop Quarry Area. The Amtoft-Amtoft very shallow-Lodar Association, 15 to 60 percent slopes (Map Unit 2) and the Dera-Dera sandy loam Association, 2 to 8 percent slopes (Map Unit 16) (Figure 4).

In general, the soils within the Amtoft-Amtoft very shallow-Lodar Association, 15 to 60 percent slopes are thin and contain excessive quantities of gravel (in some cases greater than 60 percent) and reach bedrock at approximately 28 inches or less (NRCS 2006, unpublished). This soil type is well drained, slightly alkaline, and has a slope range of 15 to 60 percent. The association is found above the valley floor over bedrock and has angular cobble-sized material in addition to the gravel content. The deepest soils of this association are found on the convex slopes. The shallow soils favor black sagebrush and Utah juniper over Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*).

Soils within the Dera-Dera sandy loam Association, 2 to 8 percent slopes reach bedrock at depths of 60 inches but tend to contain greater than 35 percent gravel in subsurface horizons. This soil type is well drained, slightly alkaline, and has a slope range of 2 to 8 percent. The Dera-Dera sandy loam association is located on the valley floor areas and at the mouths of the short canyons. The soils of this association are fairly suited for use in reclamation; however, they are currently occupied by cheatgrass. Consequently, salvage of these soils is also likely to transport cheatgrass seed to the stockpiles, facilitating the establishment of cheatgrass during reclamation.

4.1.2 Field Survey

SRK established five soil pits within the East Allsop Quarry Area (Figure 4). Two of the pits were established in the Dera-Dera sandy loam Association, 2 to 8 percent slopes and two were established in the Amtoft-Amtoft very shallow-Lodar Association, 15 to 60 percent slopes (Table 2). The fifth soil pit (EAQ-5) was established in a possible inclusion to this Amtoft-Amtoft very shallow-Lodar Association, 15 to 60 percent slopes. This soil was reddish in color but no rock outcrop of similar color was observed on site. However, a reddish rock is exposed in the highwall of the Poison Mountain Quarry and it appears that the soil at EAQ-5 was derived from this reddish rock.

Sample EAQ-1 and EAQ-4 were typical of the Amtoft-Amtoft very shallow-Lodar with a high percentage of gravels and sands (Appendix A). The percentage of fines (silt and clay) was less than eight percent in both samples. The water holding capacity of these soils is low, and the shallow depths make the soils quite droughty. Sample EAQ-5 was typical of this same association, except the color distinguished this sample from all others. While this sample

Table 2: Soil Samples from East Allsop Quarry Area

Sample ID	Soil Map Unit	Soil Pit Depth (inches)	Description	Salvageable Depth (inches)
EAQ-1	2	14	Sandy, gravelly soil with cobble	14
EAQ-2	16	20	Sandy loam with gravel and cobble	20
EAQ-3	16	20	Sandy loam with gravel and cobble	20 +
EAQ-4	2	18	Silty, gravelly loam	18
EAQ-5	2	12	Reddish color, fine angular gravel	12

did not have as high gravel content as the EAQ-1 and EAQ-4, it would be classified as a gravelly sandy loam.

There has already been some salvage of the Dera-Dera sandy loam Association, 2 to 8 percent slopes soils at the East Allsop Quarry (Photo 1). The soils have been scraped from the surface to create berms to contain rocks and boulders rolling down the slopes as a result of the quarrying activity. The photo shows that over 20 inches of soil could be salvaged from these lower slopes. However, note the amount of stony material within the scraped area.

Photo 1 : Area of soil salvage at East Allsop Quarry Area within Map Unit 16

Within the Amtoft-Amtoft very shallow-Lodar Association included soils over limestone bedrock. The bedrock outcrops at many locations in the hills and the soil depth varies from no soil to about 36 inches. However, most of the soils greater than 12 inches have a zone of large gravel and cobble at about 16 inches (range of 14 to 20 inches) (Photo 2).

Photo 2: Cut bank demonstrating the cobble layer at approximately 18 inches below the surface.

This association has a high percentage of gravels and sands and the samples from BS-1, BS-2, BS-4, BS-5, and BS-6 demonstrate this trait (Appendix A). The percentage of fines (silt and clay) was less than 8.5 percent in all samples, with BS-1 having only 5.9 percent fines. The lack of fines combined with relatively shallow depths limits the water holding capacity of these soils. However, BS-6 was a relatively deep soil which supported mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*). All of the samples from this association had over 33 percent gravel in the upper 12 to 20 inches. These soils are characterized as either very gravelly sandy loams or stony loams.

The Sanpete-Spager Association soils occupied the valley floor and lower slopes of the foothills. Soils pits BS-3, BS-4, and BS-7 were located within this association. The samples ranged 6.5 to 9.0 percent fines (silt and clay), and were variable in the amount of gravels (46 to 60 percent) (Appendix A). This soil should have less water holding capacity in the upper layers than the other soils sampled due to the high percentage of gravels. These deeper soils supported an extremely dense cover of cheatgrass where previously burned and Wyoming big sagebrush in unburned areas. However, soil pit BS-7 had an extremely stony layer at about 12 inches below ground surface. The initial 12 inches consisted of gravelly, sandy loam. Where root penetration was possible, this association supported big sagebrush, and where the soil was shallow, black sagebrush (*Artemisia nova*) was the dominant species. Burned areas were dominated by cheatgrass.

The Dera-Dera Association occurred on a small portion of the area near the Big Sage Reservoir (Figure 5). Soil pit BS-8 was located in this soil association and had the highest content of fines (13.1 percent) of all soils sampled (Appendix A). This soil association also had a high content of fince sands (32.9 percent) relative to the other soils, which had more medium and coarse sands. The gravel content of this sample was also relatively low (32.2 percent) given the amount of gravel visible on the soil surface. This association supported big sagebrush, with very little vegetation in the shrub interspaces. Burned areas were dominated by cheatgrass.

5 Conclusions and Recommendations

5.1 Conclusions

All of the soils observed during the survey are basically suited for use in reclamation. The major limiting factor for all of the soils was the amount of sand and gravel relative to the fines. The presence of the gravels (and stones) has potential to limit the ability to drill seed into these growth media when redistributed over recontoured facilities. However, all of the soils supported vegetation with relatively high production (400 to 800 lbs total dry weight production, NRCS unpublished data). Similarly, none of the soils in the survey area were rated as having high salinity, nor did the vegetation present indicate high salt values. Shadscale and some other salt desert shrubs were present, but not as dominant species, indicating moderate salt content. The presence of black sagebrush and Wyoming big sagebrush on the sites was also an indication that the soils were not saline. The vegetation also confirmed that NRCS unpublished data that indicated the pH was slightly alkaline, which is expected given that the soils are derived from limestone. However, the pH values provided by NRCS were in the 7.9 to 9.0 range.

Figures 6 and 7 show the areas with potential for soil salvage at the East Allsop site and the Big Sage Valley area, respectively. The areas depicted in the figures were based on slope and distance form rock outcrops, where the soil is likely to be shallow. Generally the slope is less than 15 percent and the areas are 100 feet or more from outcrops. Salvageable soils occur in the remaining portions of the survey area; however, the volume per acre is likely to be low, the percent of large rocks is likely to be high, and the steepness of the slopes may interfere with safe salvage.

5.2 Recommendations

With respect to soil salvage, SRK recommends that at least 12 inches of soil be salvaged from all sites where disturbance is proposed, unless the depth to bedrock is less than 12 inches. Where soil is being salvage from the valley floor, at least 18 inches is likely to be suitable for salvage and up to 36 inches in some locations.

Where the native vegetation is present, the following can be used as a guide:

- Wyoming big sagebrush is the dominant vegetation – salvage up to 24 inches;
- Black sagebrush is the dominant vegetation (or co-dominant with juniper) – salvage up to 18 inches (a duripan may occur before the 18-inch depth, in which case, salvage everything above the duripan); and
- Avoid salvaging boulders and large cobble as they will make seeding difficult after growth media redistribution.

Where the native vegetation has burned and been replaced with cheatgrass, consider the following:

- Assume 18 inches of salvageable material, but scrape deeper to determine the maximum salvageable depth. Because the cheatgrass is primarily on the valley floors, additional soil may be available;
- Scrape the top two inches of soil and put off to the side. This material will contain the cheatgrass and cheatgrass seed and should not be used as direct haul material for reclamation. The cheatgrass-containing soil should be placed where it will be covered by the salvaged soil stockpile, covered by waste rock material, or placed in the bottom of completed quarries. When covered by the soil stockpile or waste rock, the seed will not have an opportunity to germinate, and will lose its viability over time, eliminating this source of seed. By placing in the bottom of existing quarries, the seed may germinate but the long-term protection from fire or other surface disturbance may create conditions where other perennial grasses can establish and eventually co-dominate with cheatgrass.

In all cases, stockpiled growth media should be seeded with crested wheatgrass or other aggressive species to prevent the stockpiles from becoming infested with cheatgrass. This will reduce the amount of cheatgrass that will establish when the growth media is redistributed.

Prepared by

Gary N. Back
Principal Ecologist

Reviewed by

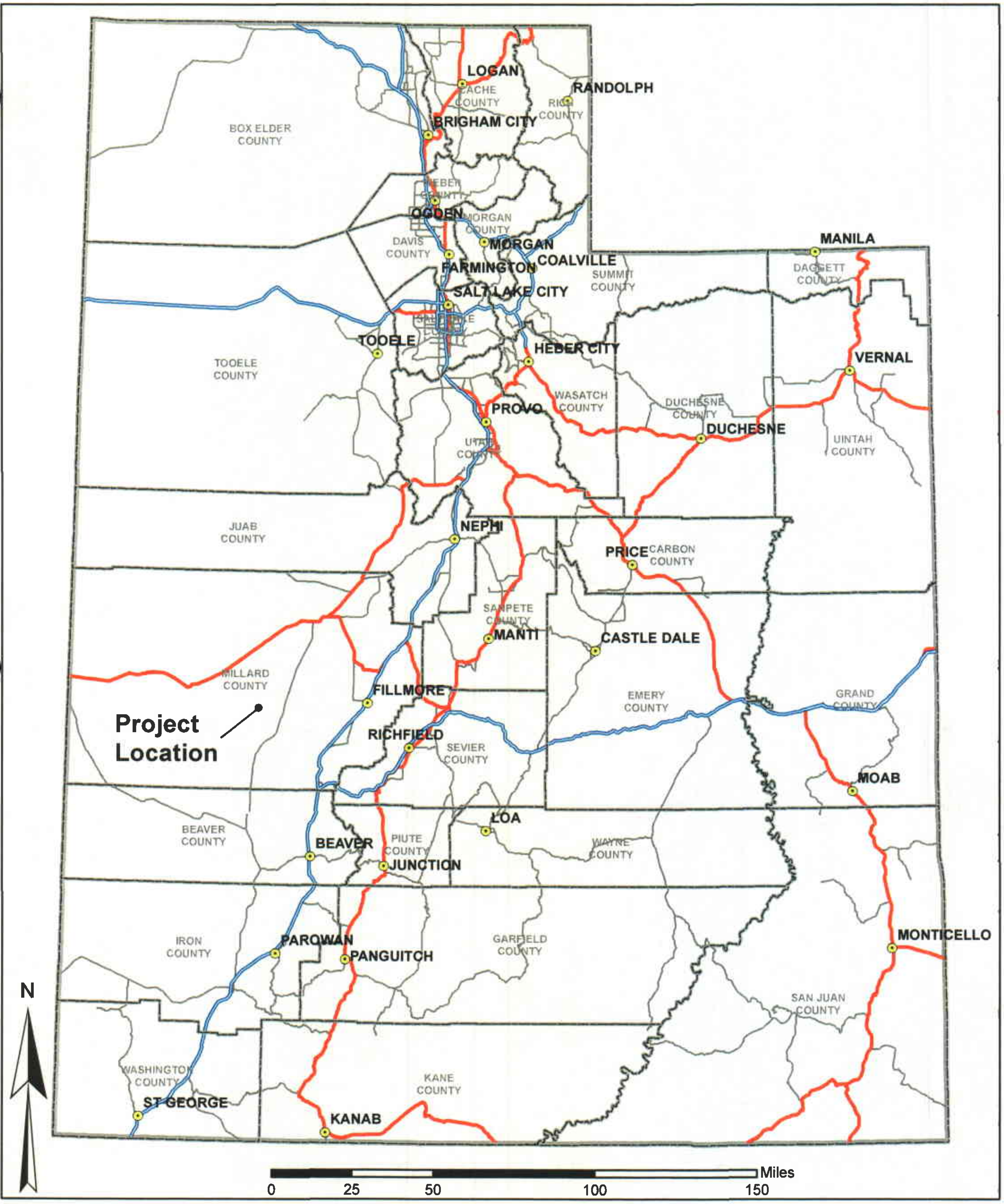
Val Sawyer
Principal

6 References

Natural Resources Conservation Service (NRCS). Unpublished soil survey data. Richfield Office.

U.S. Dept. of Agriculture, SCS. (USDA-NRCS). 1983. National Soils Handbook 430-VI-N.H. Washington, D.C.

Figures



EXPLANATION

- City
- Limited Access
- Highway
- Major Road

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CHECKED			
APPROVED			
REVISED			
REVISED			

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
MILLARD COUNTY, UTAH
LOCATION MAP

SRK Consulting
Engineers and Scientists

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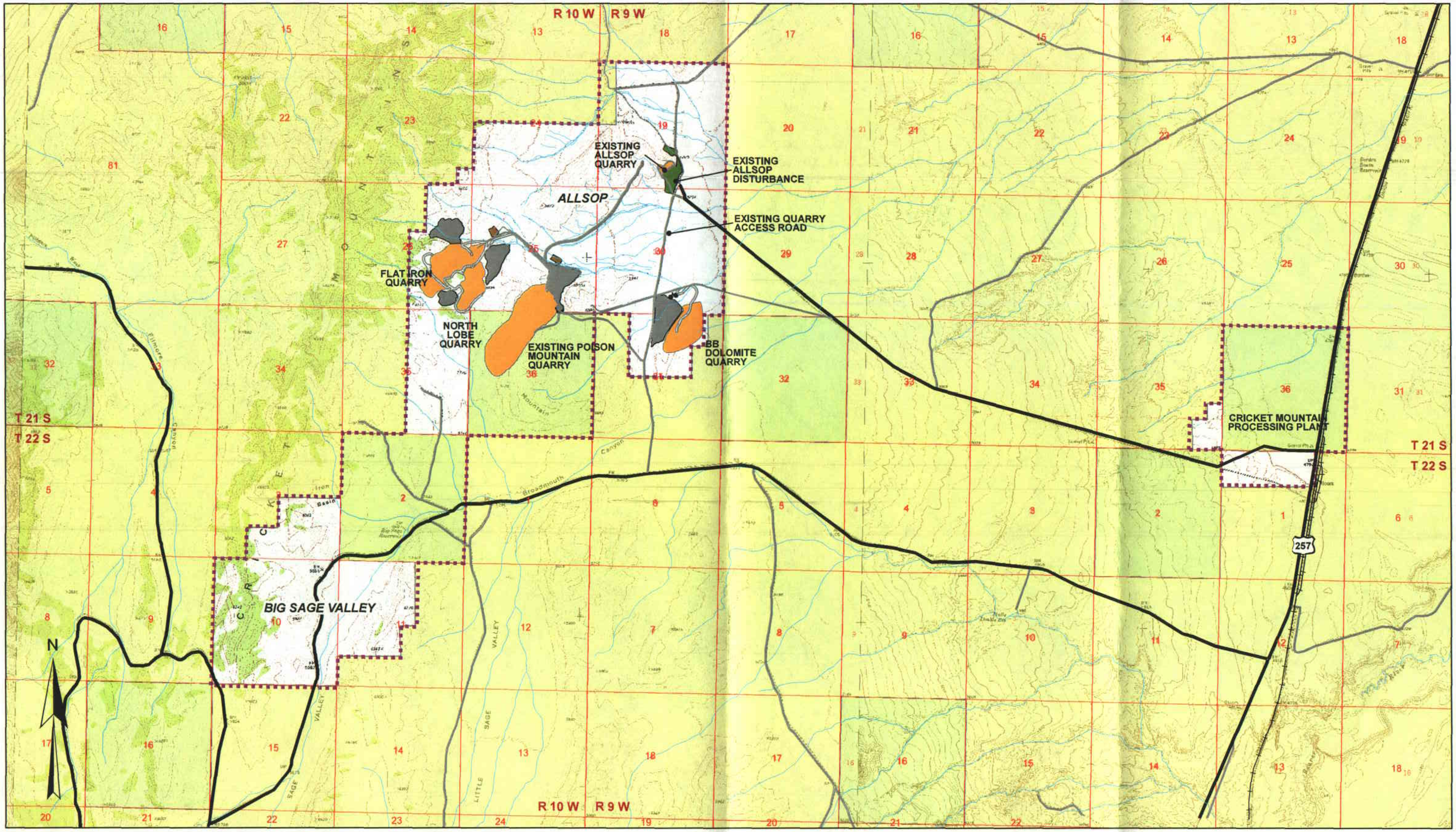

STRUCTURES	PROPERTY BOUNDARY
EXISTING WASTE ROCK FACILITY	**LAND OWNER**
EXISTING SOIL STOCKPILE	BLM
EXISTING QUARRY FACILITY	PRIVATE
EXISTING QUARRY AND ASSOCIATED DISTURBANCE	STATE TRUST LAND

Feet

0 2,000 4,000 6,000

1 inch equals 3,750 feet OR 1:45,000

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

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Engineers and Scientists

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GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
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SRK JOB NO. 138406

REVISION NO. A

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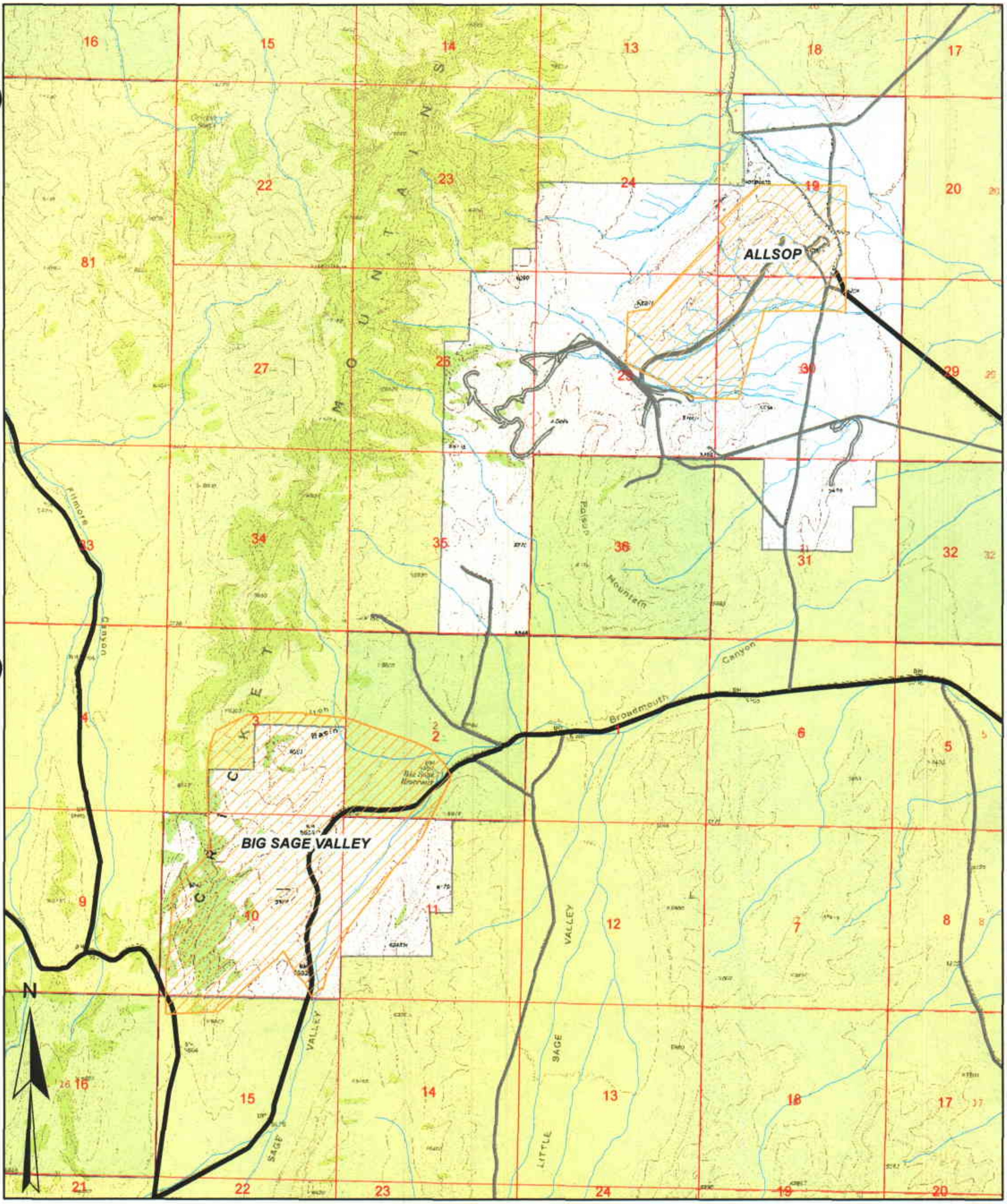

EXPLANATION

Expansion Areas

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REVISED		
REVISED		

FIGURE 3

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
SOIL SURVEY AREAS

SRK Consulting
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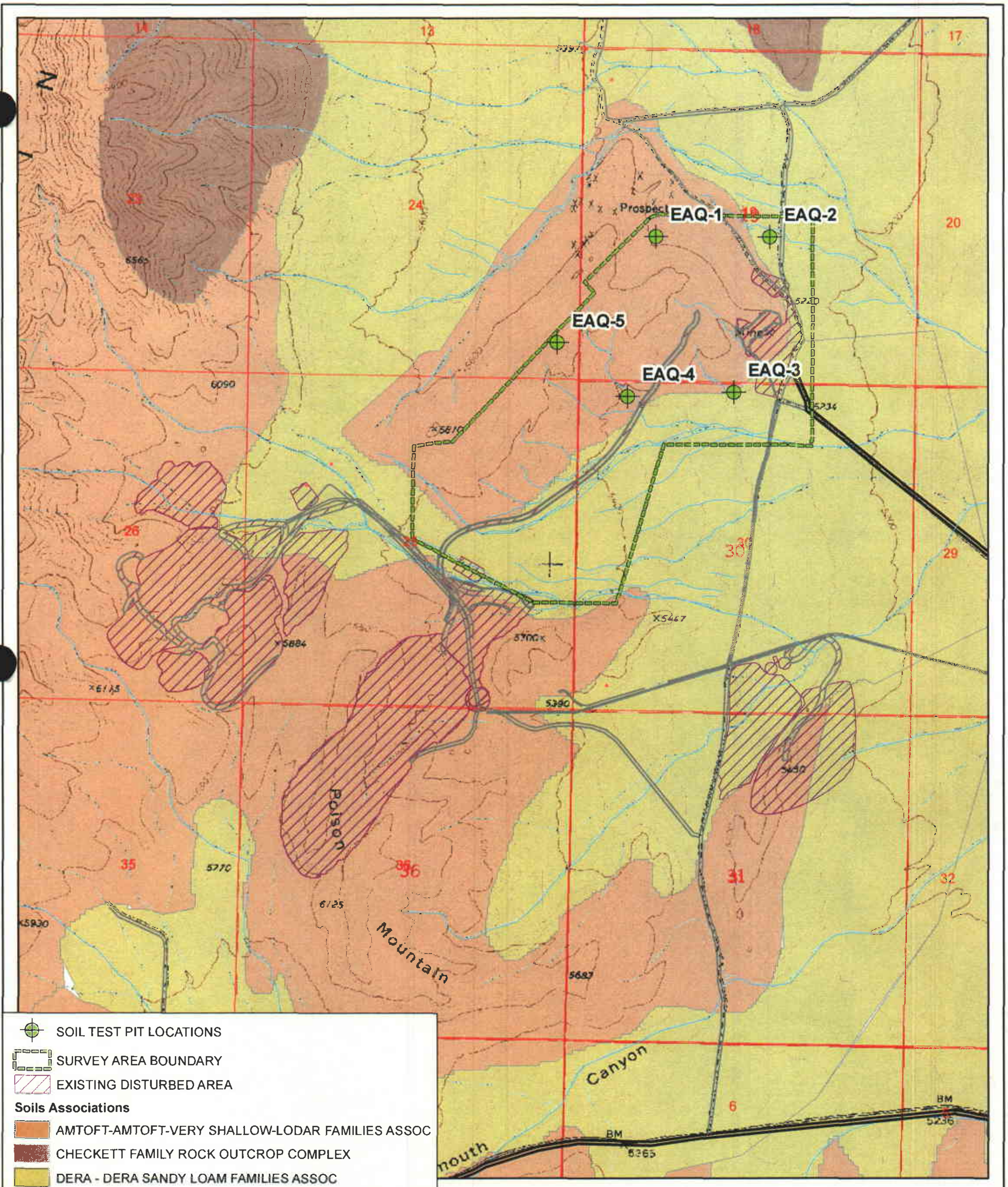

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APPROVED			**EAST ALLSOP QUARRY AREA**
REVISED			**SOIL ASSOCIATIONS**
REVISED			

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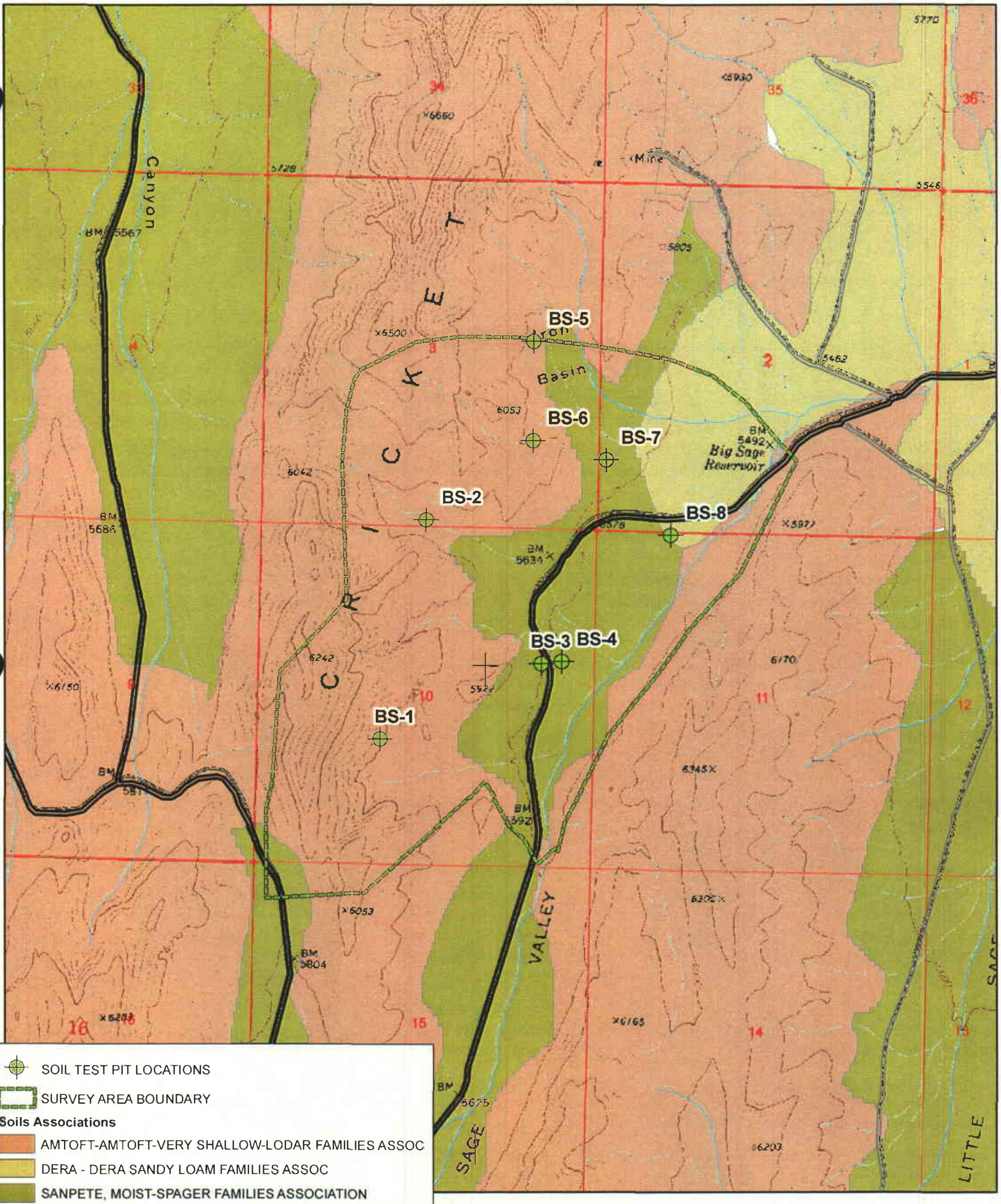

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APPROVED		
REVISED		
REVISED		

FIGURE 5

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
BIG SAGE VALLEY AREA
SOIL ASSOCIATIONS

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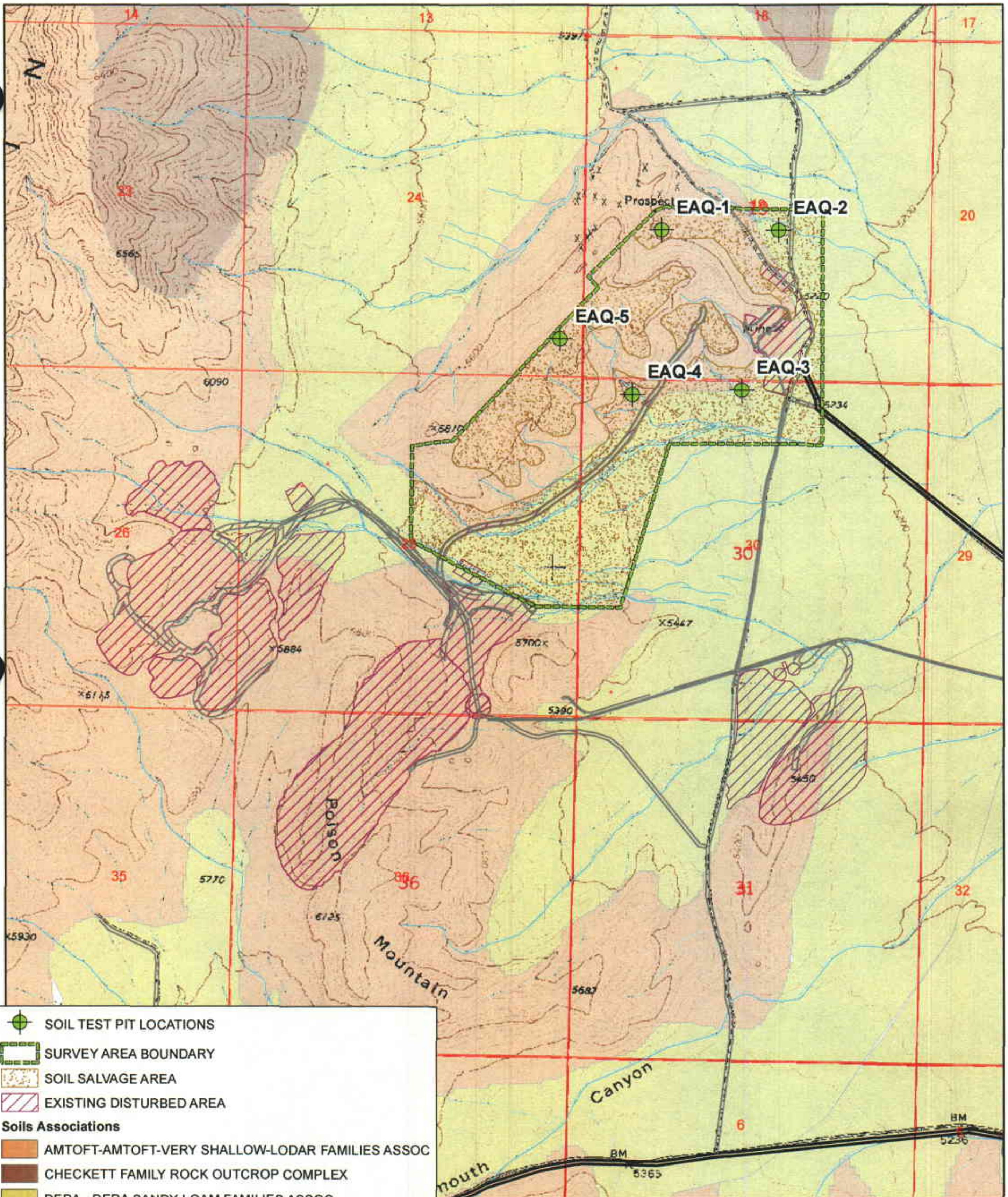

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APPROVED			
REVISED			
REVISED			

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
EAST ALLSOP QUARRY AREA
SOIL SALVAGE AREAS

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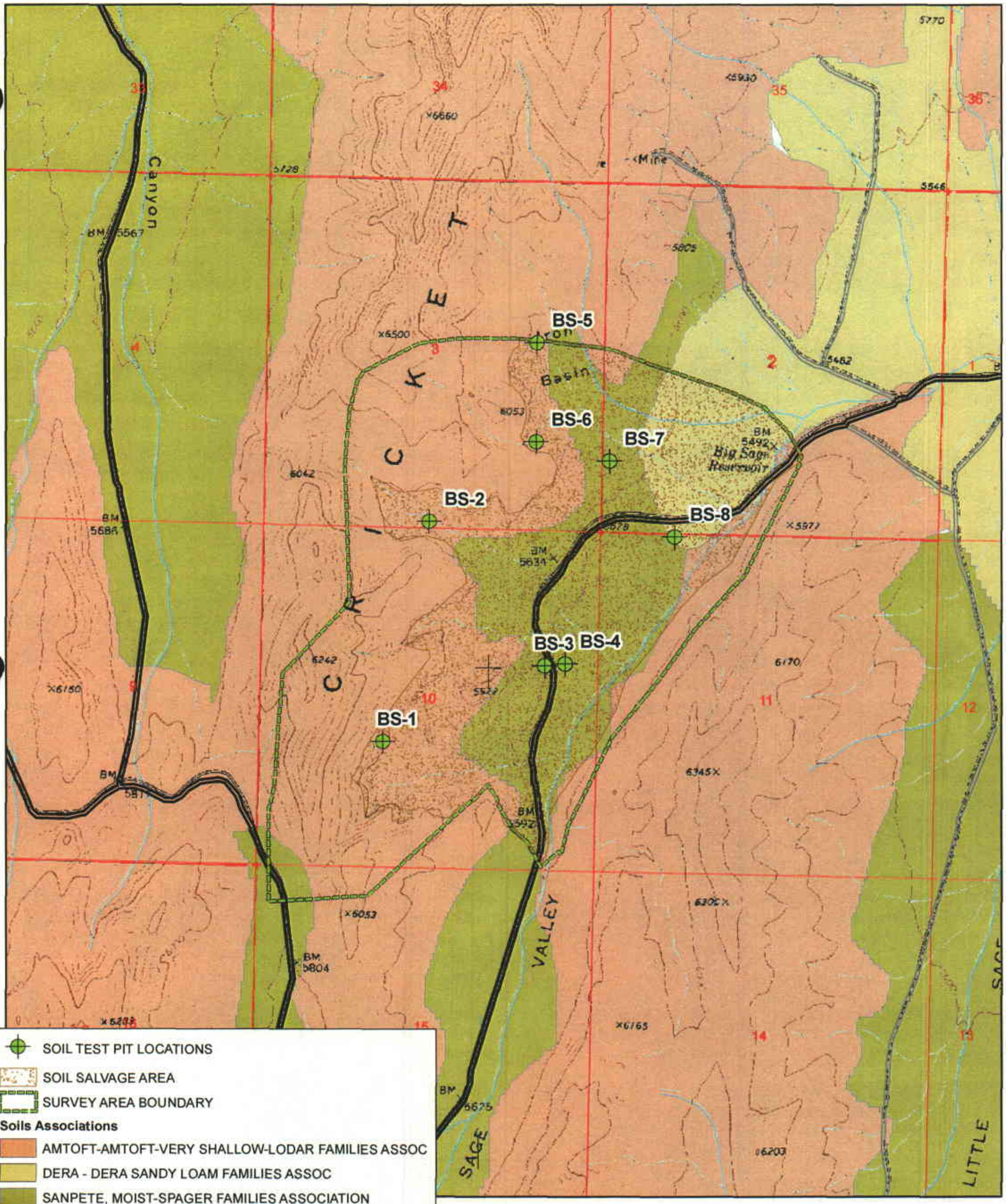
Engineers and Scientists

SCALE:	AS SHOWN	REVISION
JOB NO:	138406	A
MAP NAME:	Fig6_East_Allsop_Soil_Salvage_RSS_20070327.mxd	

Path: G:\Sites\Cricket_Mountain\Graymont_Western\138406_000_ALLSOP_BIGSAGE_BASELINE\Fig6_East_Allsop_Soil_Salvage_RSS_20070327.mxd



DESIGNED	GNB	03/20/07	FIGURE 7
DRAWN	RSS	03/27/07	
CHECKED			
APPROVED			
REVISED			
REVISED			

GRAYMONT WESTERN U.S., INC
CRICKET MOUNTAIN PROJECT
BIG SAGE VALLEY AREA
SOIL SALVAGE AREAS

SRK Consulting
Engineers and Scientists

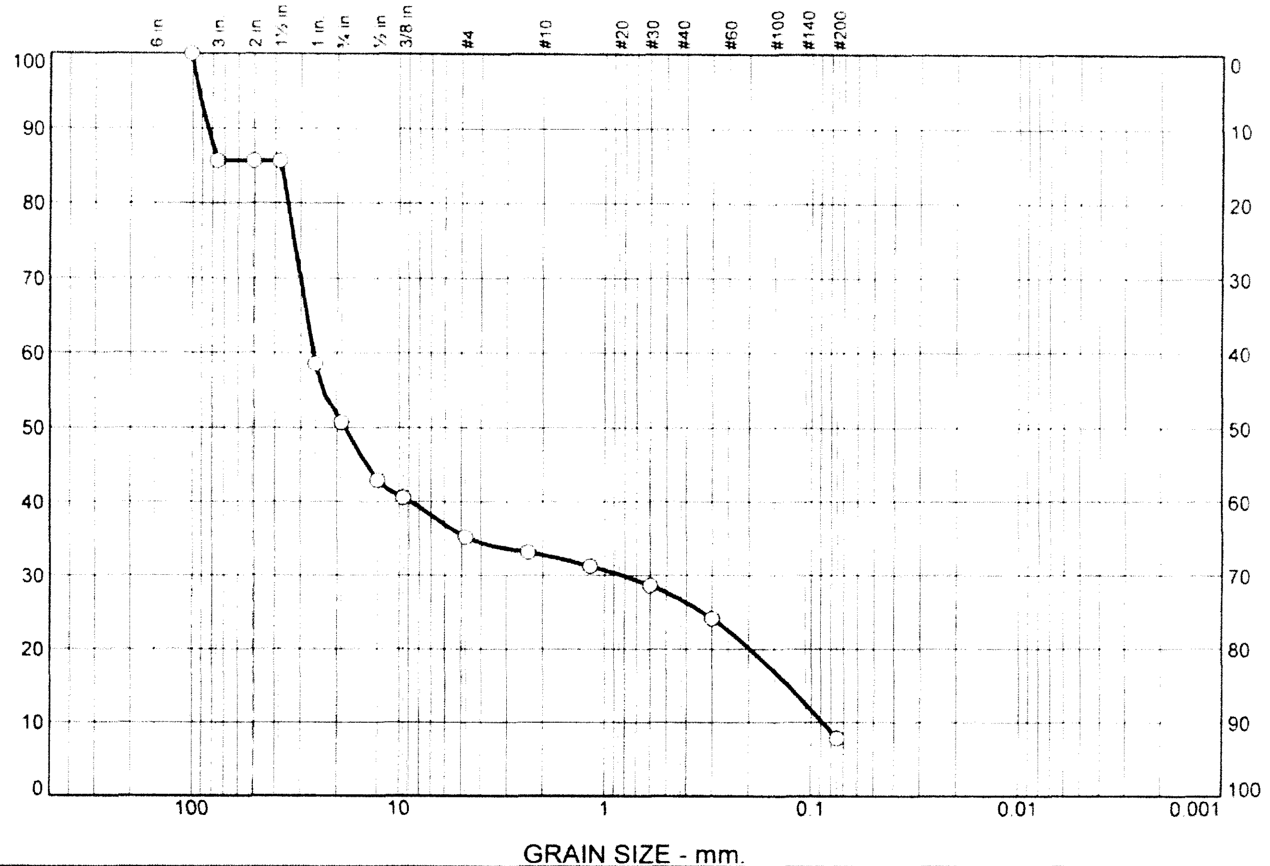
SCALE:	AS SHOWN	REVISION
JOB NO:	138406	A
MAP NAME: Fig7_Big_Sage_Soil_Salvage_RSS_20070327.mxd		

Path: G:\Sites\Cricket_Mountain\Graymont_Western\138406_000_ALLSOP_BIGSAGE_BASELINE\Fig7_Big_Sage_Soil_Salvage_RSS_20070327.mxd

Appendices

Appendix A: Soil Texture Analysis Data Sheets

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
14.3	35.0	15.5	2.4	6.1	18.9	7.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	85.7		
2"	85.7		
1.5"	85.7		
1"	58.5		
3/4"	50.7		
1/2"	42.9		
3/8"	40.5		
#4	35.2		
#8	33.2		
#16	31.2		
#30	28.6		
#50	24.2		
#200	7.8		

* (no specification provided)

Material Description

Poorly graded gravel with silt and sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 37.4321 D_{60}= 26.0787 D_{50}= 18.3389
D_{30}= 0.8248 D_{15}= 0.1293 D_{10}= 0.0881
C_u= 295.98 C_c= 0.30

Classification

USCS= GP-GM AASHTO= A-1-b

Remarks

7.0% Moisture when delivered to lab.

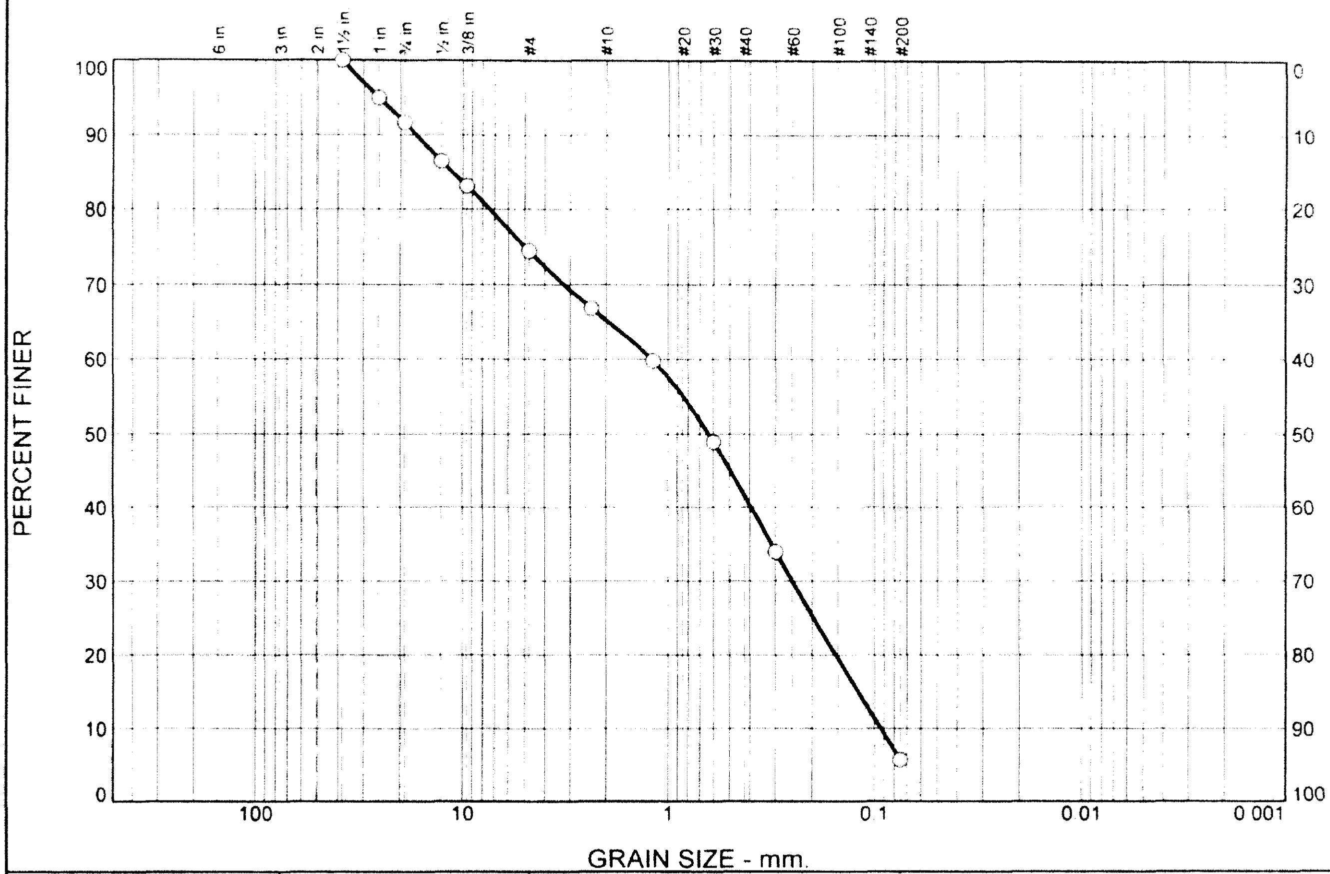
Location: EAQ-1 **Date:** 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.3	17.3	9.1	23.6	36.0	5.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	94.9		
3/4"	91.7		
1/2"	86.4		
3/8"	83.1		
#4	74.4		
#8	66.8		
#16	59.8		
#30	48.9		
#50	33.9		
#200	5.7		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.2568 D_{60}= 1.2037 D_{50}= 0.6355
D_{30}= 0.2500 D_{15}= 0.1202 D_{10}= 0.0933
C_u= 12.90 C_c= 0.56

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

6.0% Moisture when delivered to lab.

Location: EAQ-2

Date: 3-15-07

SRK Consulting

Elko, Nevada

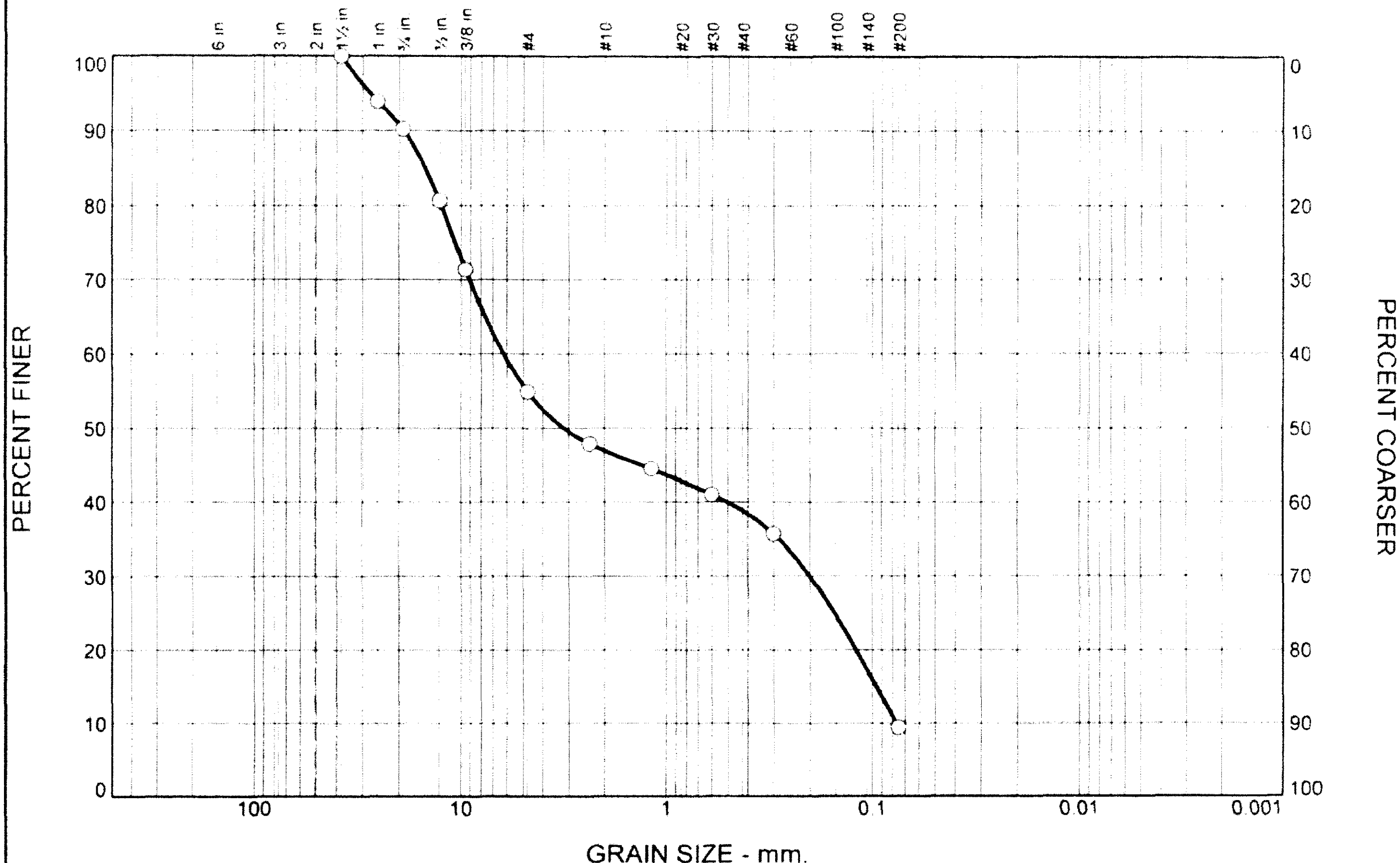
Client: Graymont Western, Inc.

Project: Cricket Mtn. Baseline

Project No: 138406

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.8	35.4	7.8	8.1	29.5	9.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	93.9		
3/4"	90.2		
1/2"	80.7		
3/8"	71.4		
#4	54.8		
#8	47.9		
#16	44.5		
#30	41.0		
#50	35.8		
#200	9.4		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 14.8203 D_{60}= 6.2347 D_{50}= 3.1765
D_{30}= 0.2003 D_{15}= 0.0959 D_{10}= 0.0769
C_u= 81.04 C_c= 0.08

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

8.4% Moisture when delivered to lab.

Location: EAQ-3

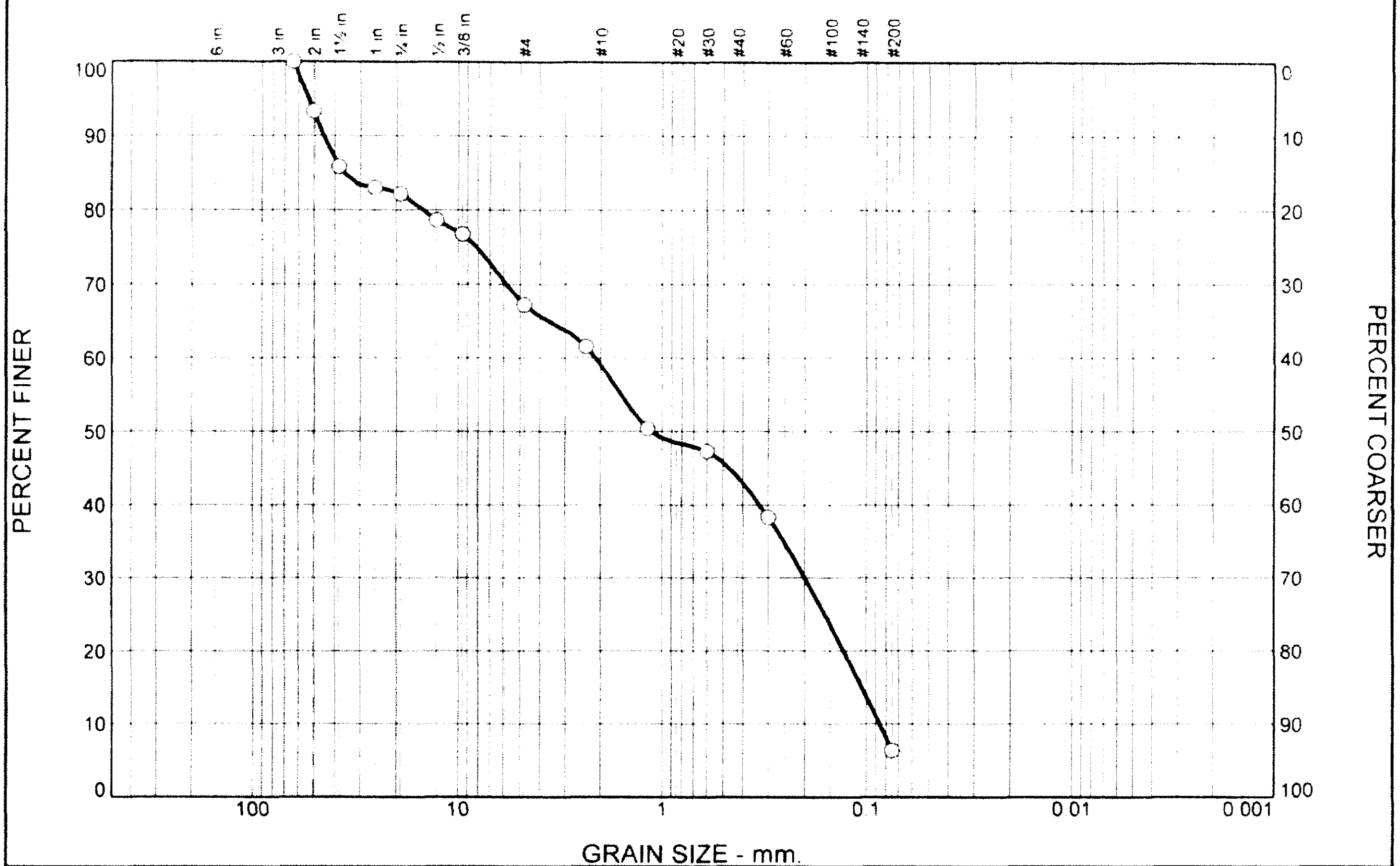
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.8	15.0	8.2	15.1	37.5	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5"	100.0		
2"	93.3		
1.5"	85.8		
1"	83.0		
3/4"	82.2		
1/2"	78.7		
3/8"	76.8		
#4	67.2		
#8	61.5		
#16	50.4		
#30	47.3		
#50	38.3		
#200	6.4		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 36.2942 D_{60}= 2.1192 D_{50}= 1.1335
D_{30}= 0.1991 D_{15}= 0.1055 D_{10}= 0.0865
C_u= 24.51 C_c= 0.22

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

9.8% Moisture when delivered to lab.

Location: EAQ-4

Date: 3-15-07

SRK Consulting

Elko, Nevada

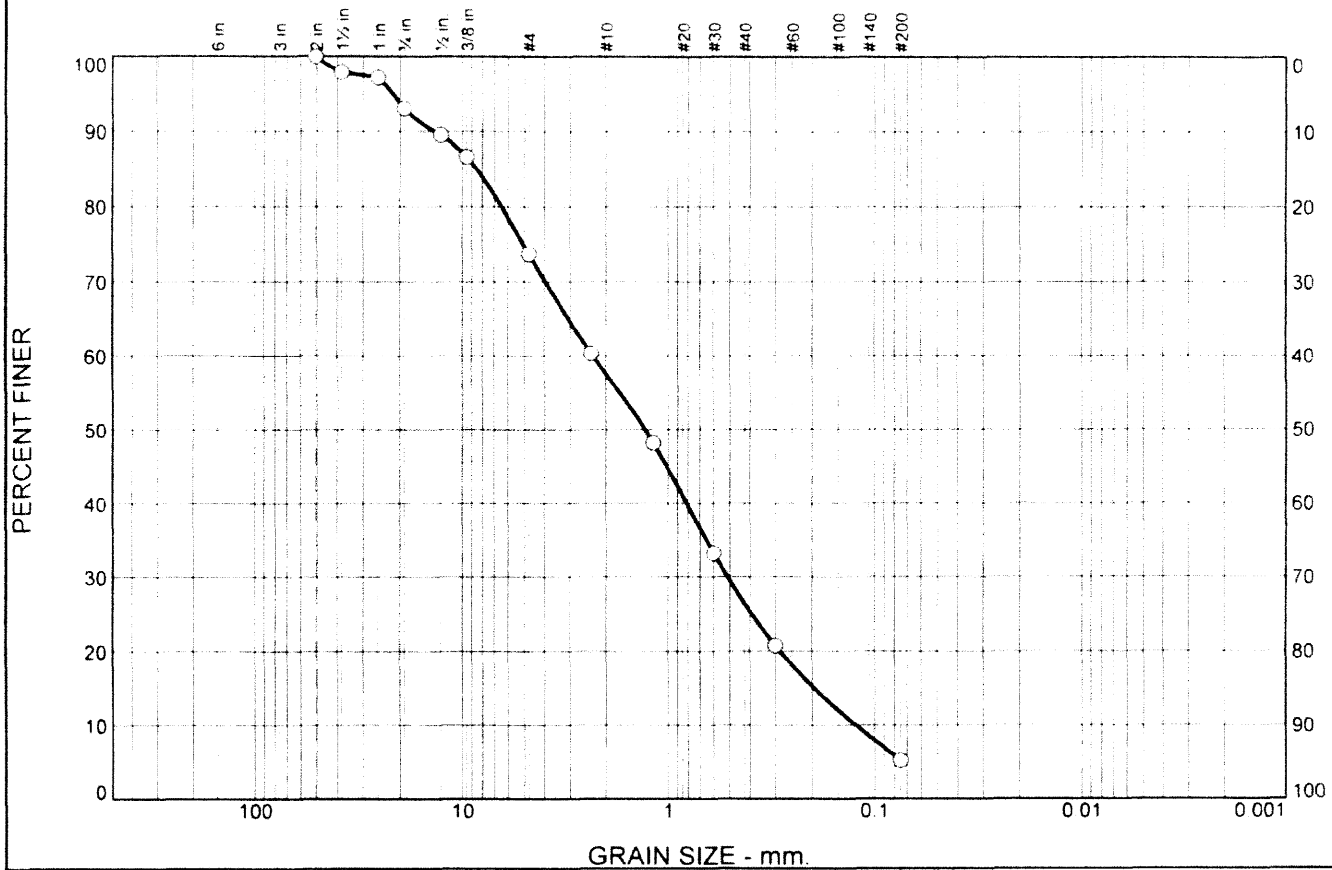
Client: Graymont Western, Inc

Project: Cricket Mtn. Baseline

Project No: 138406

Figure

Particle Size Distribution Report



% +3"	% Gravel Coarse	% Gravel Fine	% Sand Coarse	% Sand Medium	% Sand Fine	% Fines Silt	% Fines Clay
0.0	7.0	19.3	16.2	31.1	21.2	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5'	97.9		
1"	97.1		
3/4"	93.0		
1/2"	89.5		
3/8"	86.6		
#4	73.7		
#8	60.3		
#16	48.1		
#30	33.2		
#50	20.7		
#200	5.2		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 8.5117 D_{60}= 2.3170 D_{50}= 1.2977
D_{30}= 0.5141 D_{15}= 0.1953 D_{10}= 0.1235
C_u= 18.75 C_c= 0.92

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

8.7% Moisture when delivered to lab.

Location: EAQ-5

Date: 3-15-07

SRK Consulting

Elko, Nevada

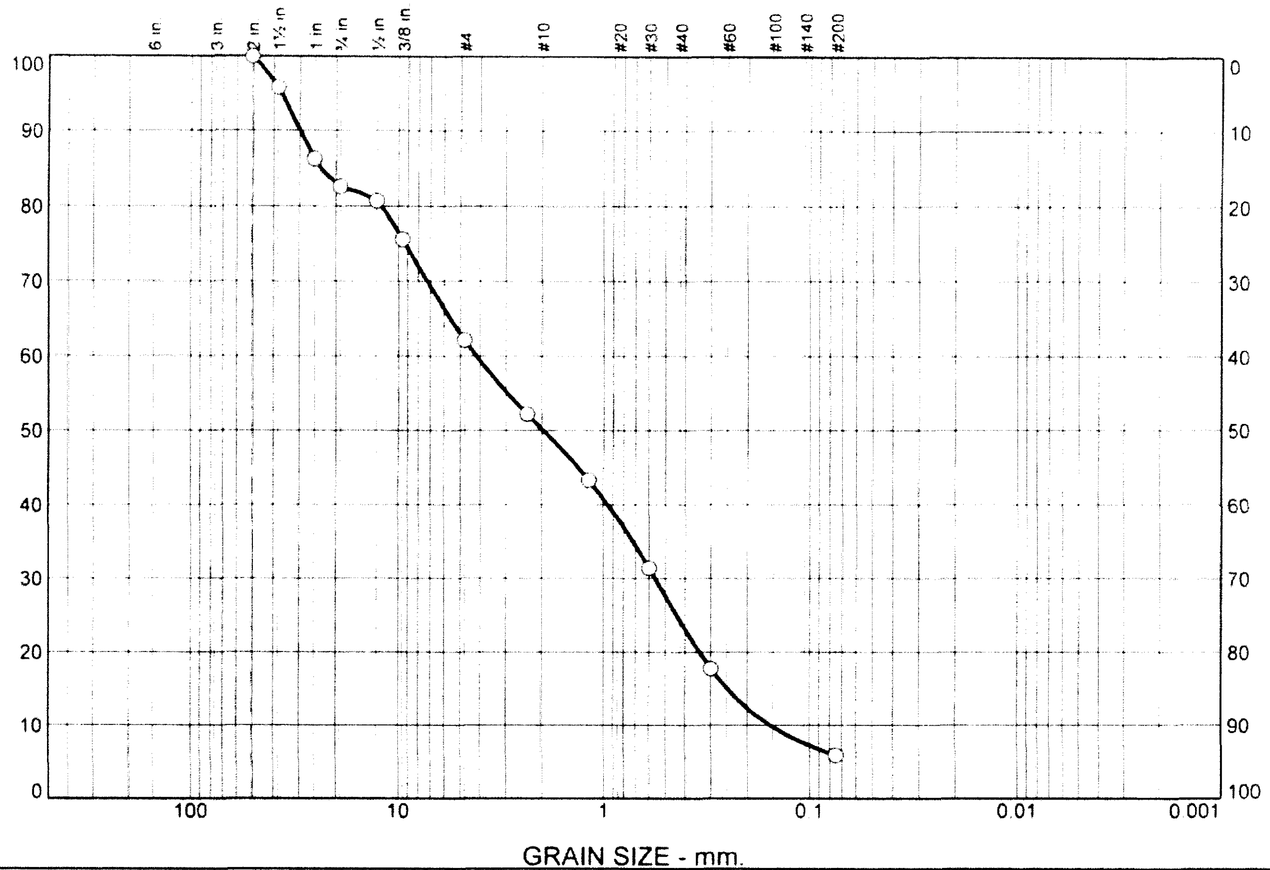
Client: Graymont Western, Inc.

Project: Cricket Mtn. Baseline

Project No: 138406

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.4	20.5	12.0	25.9	18.3	5.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	95.8		
1"	86.3		
3/4"	82.6		
1/2"	80.7		
3/8"	75.6		
#4	62.1		
#8	52.1		
#16	43.3		
#30	31.4		
#50	17.7		
#200	5.9		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 23.6999 D_{60}= 4.1698 D_{50}= 1.9794
D_{30}= 0.5611 D_{15}= 0.2507 D_{10}= 0.1556
C_u= 26.80 C_c= 0.49

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

12.4% Moisture when delivered to lab.

Location: BS-1

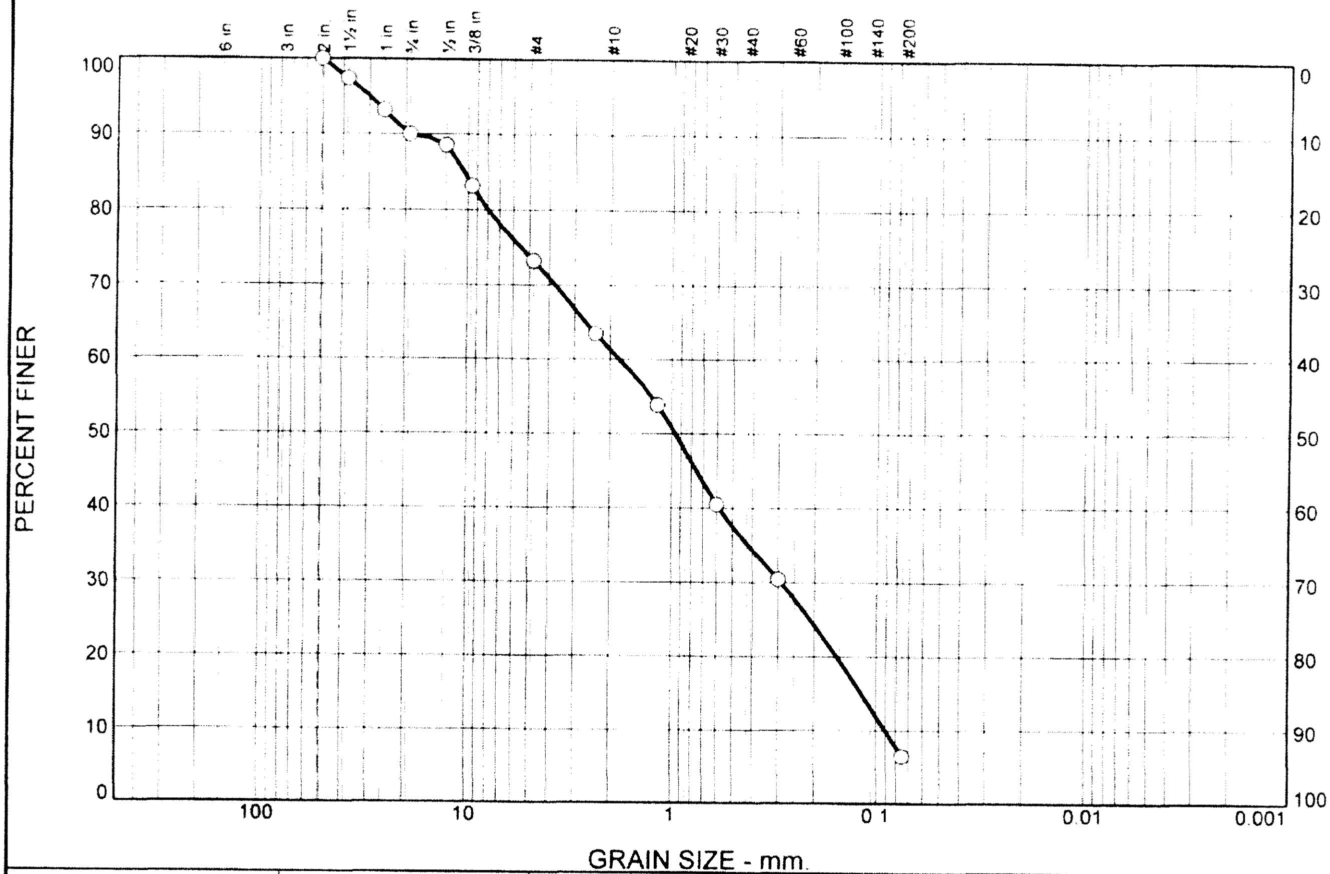
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.9	16.9	11.9	26.1	28.7	6.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	97.3		
1"	93.2		
3/4"	90.1		
1/2"	88.6		
3/8"	83.2		
#4	73.2		
#8	63.4		
#16	53.8		
#30	40.5		
#50	30.5		
#200	6.5		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 10.3974 D_{60}= 1.8042 D_{50}= 0.9654
D_{30}= 0.2901 D_{15}= 0.1181 D_{10}= 0.0904
C_u= 19.96 C_c= 0.52

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

18.4% Moisture when delivered to lab.

Location: BS-2

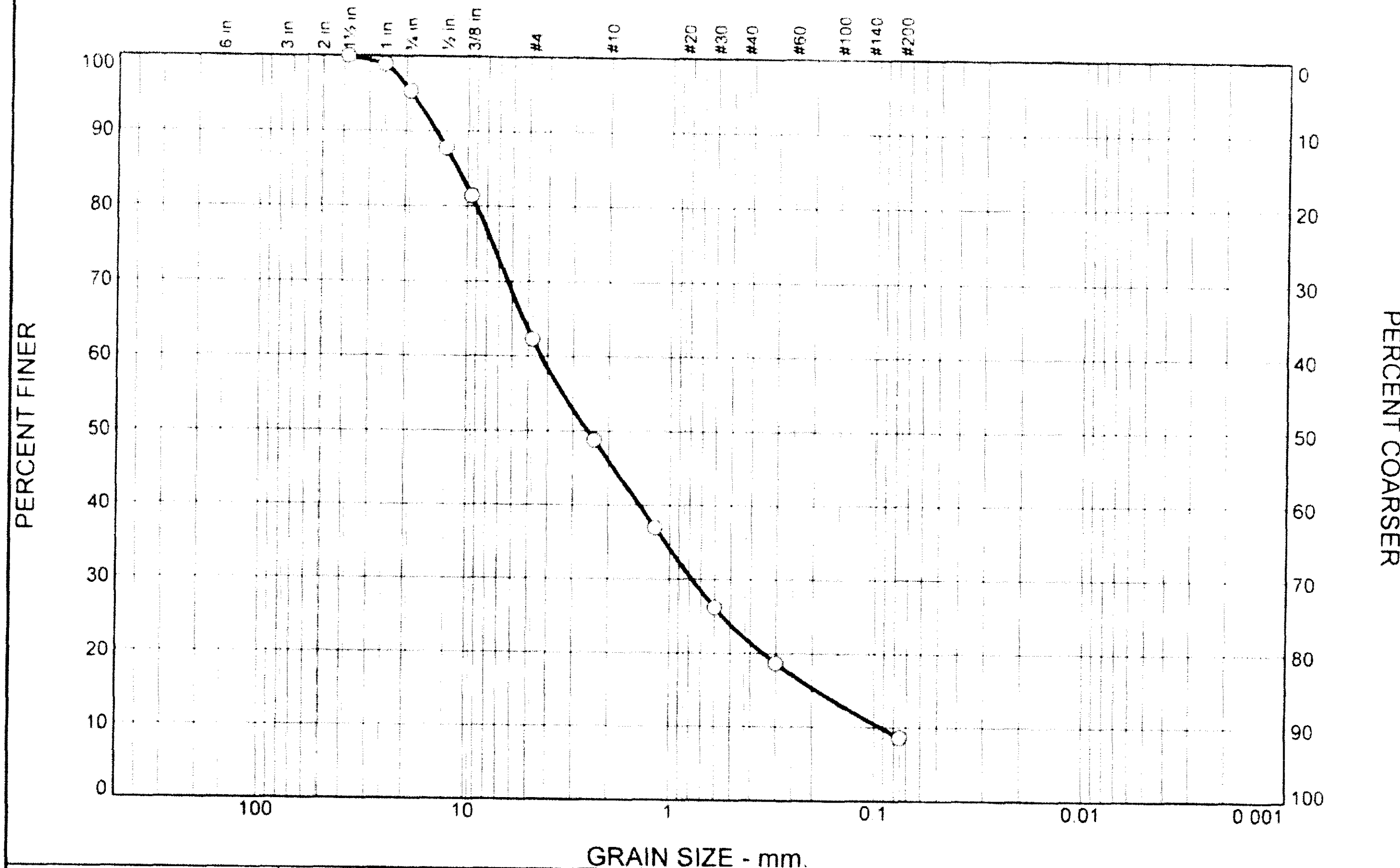
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	33.0	16.3	24.0	13.4	8.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	98.9		
3/4"	95.3		
1/2"	87.8		
3/8"	81.4		
#4	62.3		
#8	48.8		
#16	36.9		
#30	26.2		
#50	18.7		
#200	8.6		

* (no specification provided)

Material Description

Well-graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.1258 D_{60}= 4.3127 D_{50}= 2.5402
D_{30}= 0.7785 D_{15}= 0.1916 D_{10}= 0.0929
C_u= 46.44 C_c= 1.51

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

17.6% Moisture when delivered to lab.

Location: BS-3

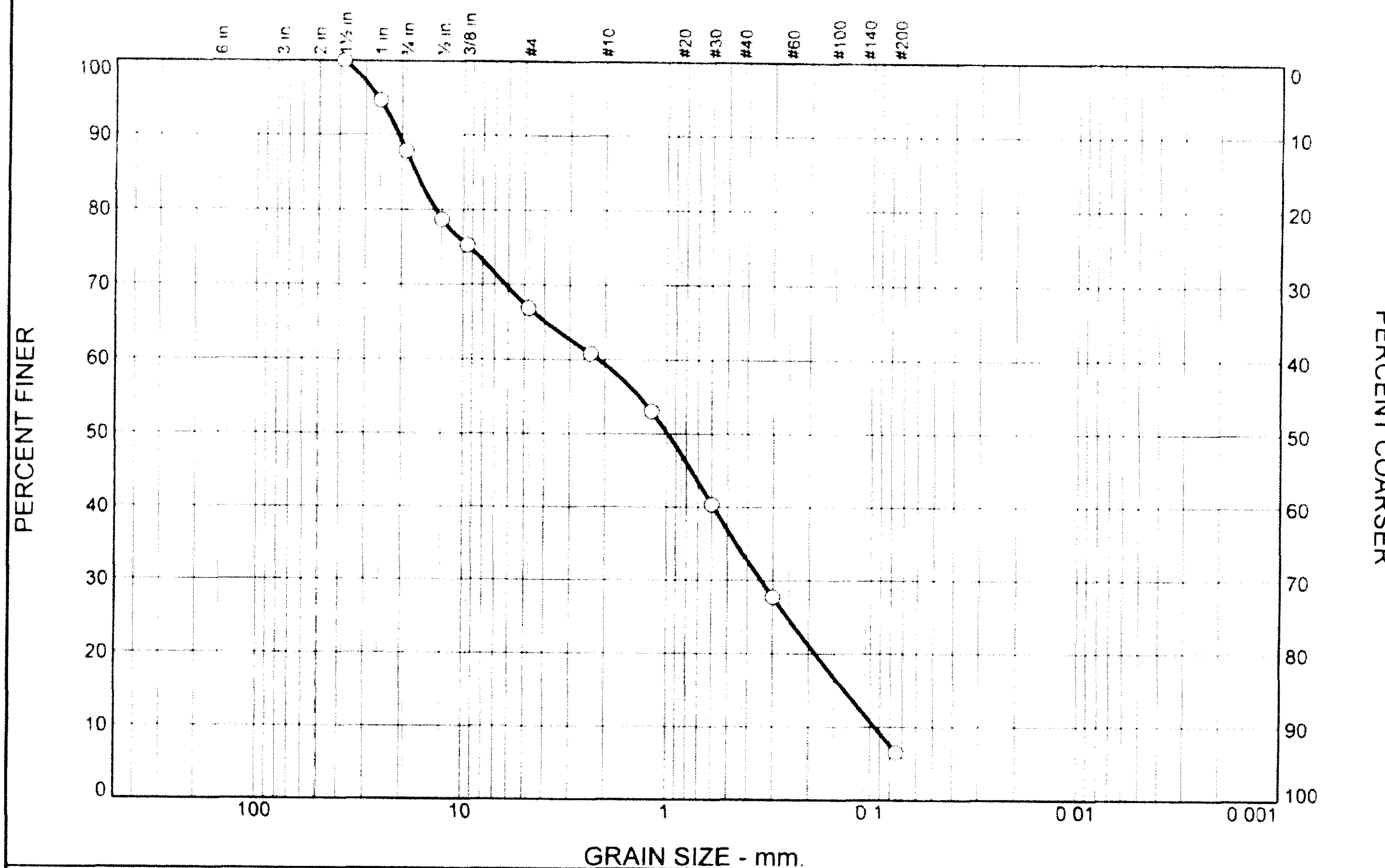
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406
Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.1	21.0	7.6	25.5	27.3	6.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	94.7		
3/4"	87.9		
1/2"	78.7		
3/8"	75.2		
#4	66.9		
#8	60.8		
#16	53.0		
#30	40.4		
#50	27.7		
#200	6.5		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 17.0310 D_{60}= 2.1508 D_{50}= 0.9852
D_{30}= 0.3425 D_{15}= 0.1339 D_{10}= 0.0954
C_u= 22.55 C_c= 0.57

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

10.2% Moisture when delivered to lab.

Location: BS-4

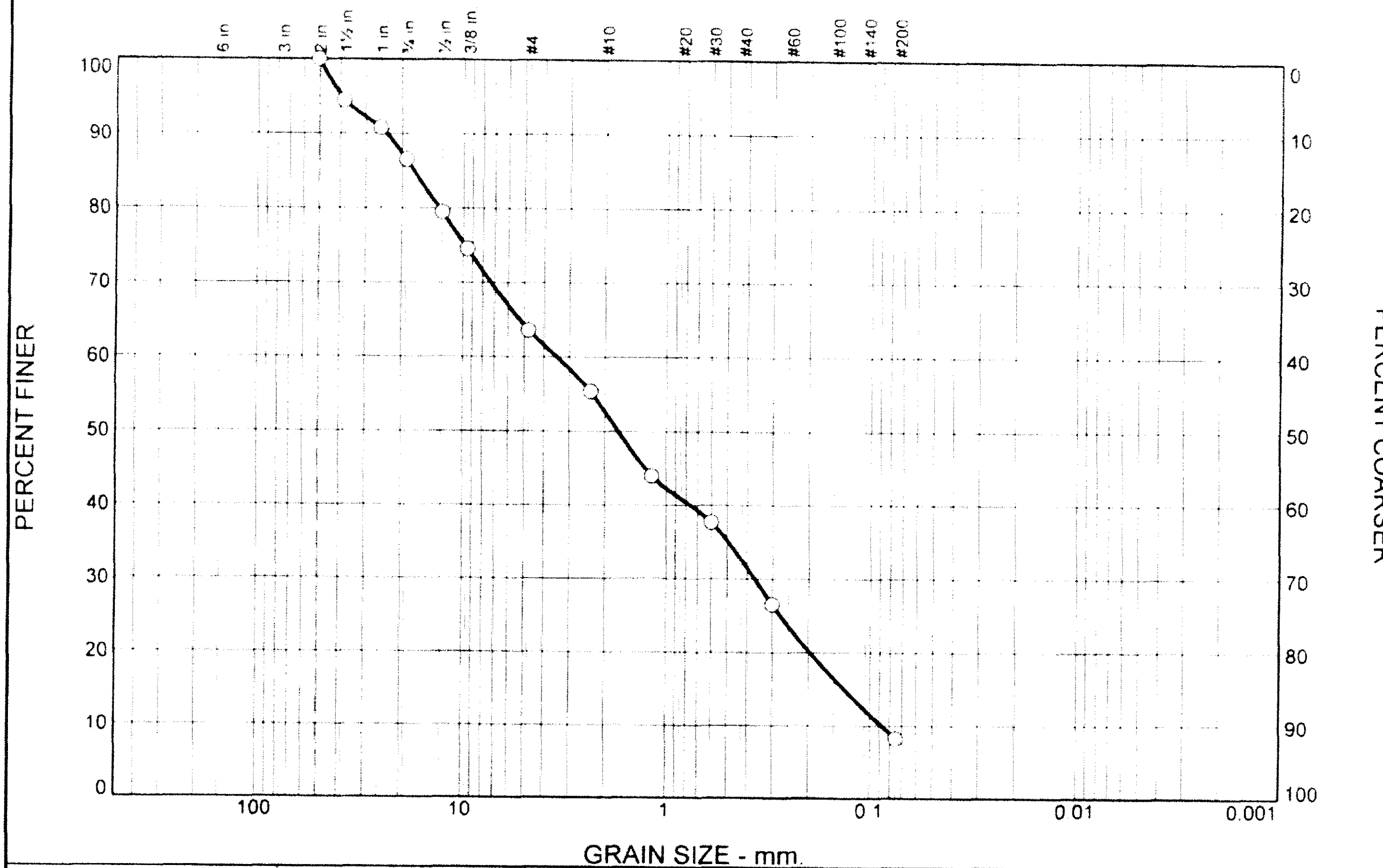
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.5	22.9	10.9	20.1	24.4	8.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	94.5		
1"	90.8		
3/4"	86.5		
1/2"	79.5		
3/8"	74.6		
#4	63.6		
#8	55.3		
#16	44.0		
#30	37.7		
#50	26.5		
#200	8.2		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 17.4426 D_{60}= 3.4537 D_{50}= 1.7212
D_{30}= 0.3659 D_{15}= 0.1345 D_{10}= 0.0879
C_u= 39.28 C_c= 0.44

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

13.4% Moisture when delivered to lab.

Location: BS-5

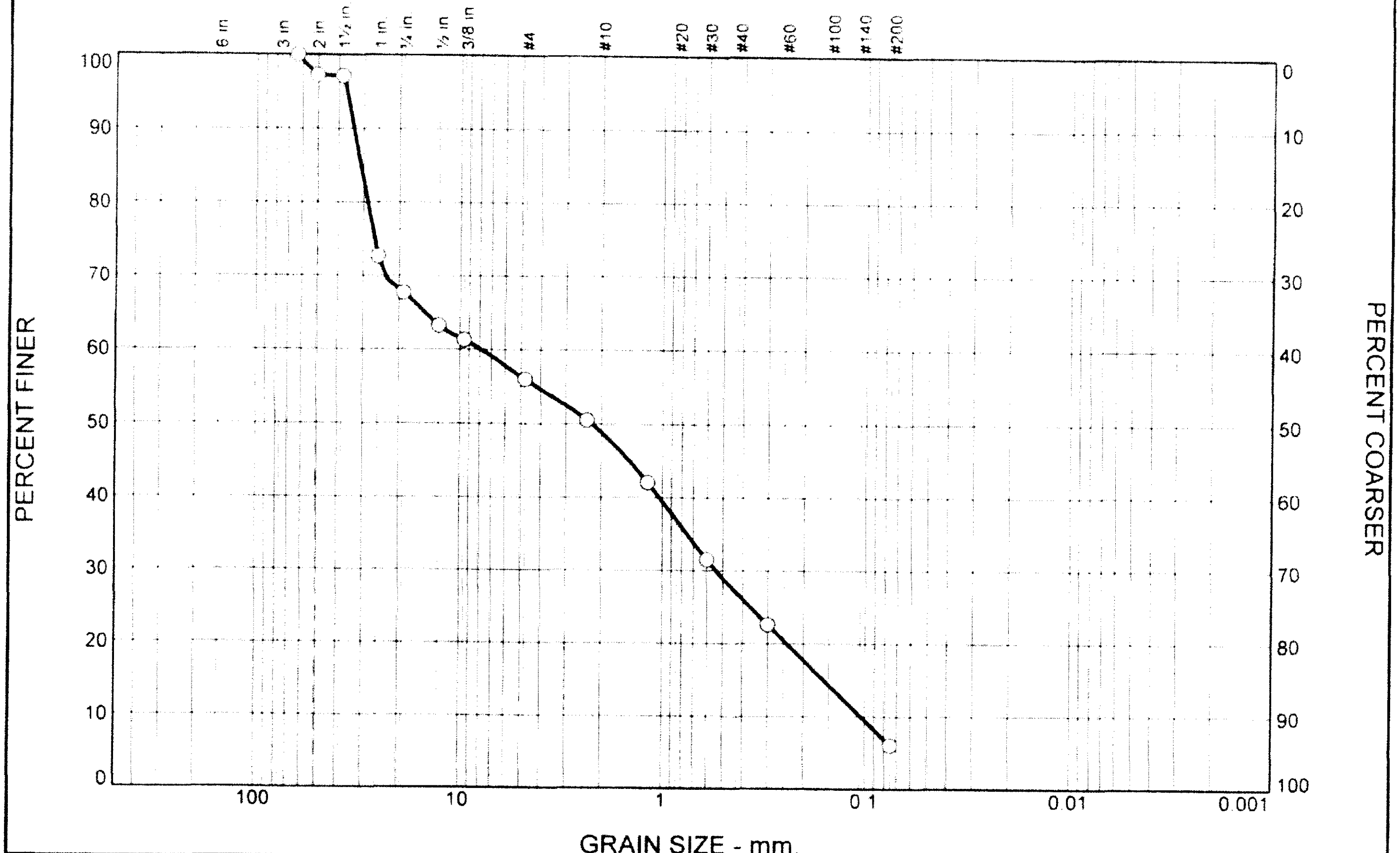
Date: 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	32.3	11.7	7.1	22.1	20.7	6.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5"	100.0		
2"	97.3		
1.5"	97.1		
1"	72.7		
3/4"	67.7		
1/2"	63.2		
3/8"	61.3		
#4	56.0		
#8	50.5		
#16	42.1		
#30	31.5		
#50	22.6		
#200	6.1		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 30.8107 D_{60}= 7.8428 D_{50}= 2.2356
D_{30}= 0.5406 D_{15}= 0.1592 D_{10}= 0.1045
C_u= 75.06 C_c= 0.36

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

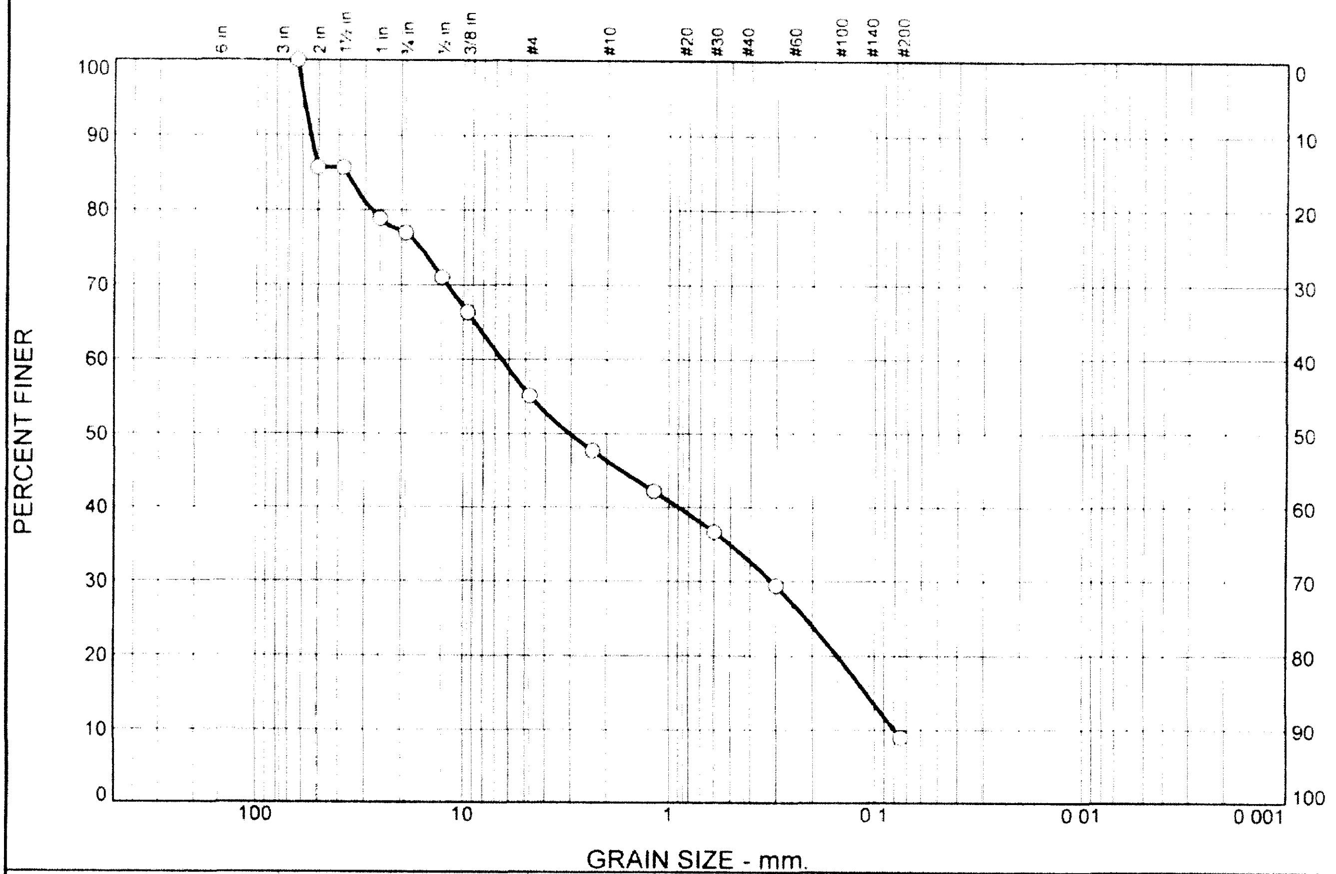
7.8% Moisture when delivered to lab.

Location: BS-6

Date: 3-15-07

SRK Consulting	**Client:** Graymont Western, Inc.
	Project: Cricket Mtn. Baseline
Elko, Nevada	**Project No:** 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.0	21.9	8.8	13.0	24.3	9.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5"	100.0		
2"	85.7		
1.5"	85.7		
1"	78.8		
3/4"	77.0		
1/2"	71.0		
3/8"	66.4		
#4	55.1		
#8	47.6		
#16	42.1		
#30	36.6		
#50	29.4		
#200	9.0		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 37.0041 D_{60}= 6.5083 D_{50}= 3.0655
D_{30}= 0.3161 D_{15}= 0.1096 D_{10}= 0.0800
C_u= 81.34 C_c= 0.19

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

6.8% Moisture when delivered to lab.

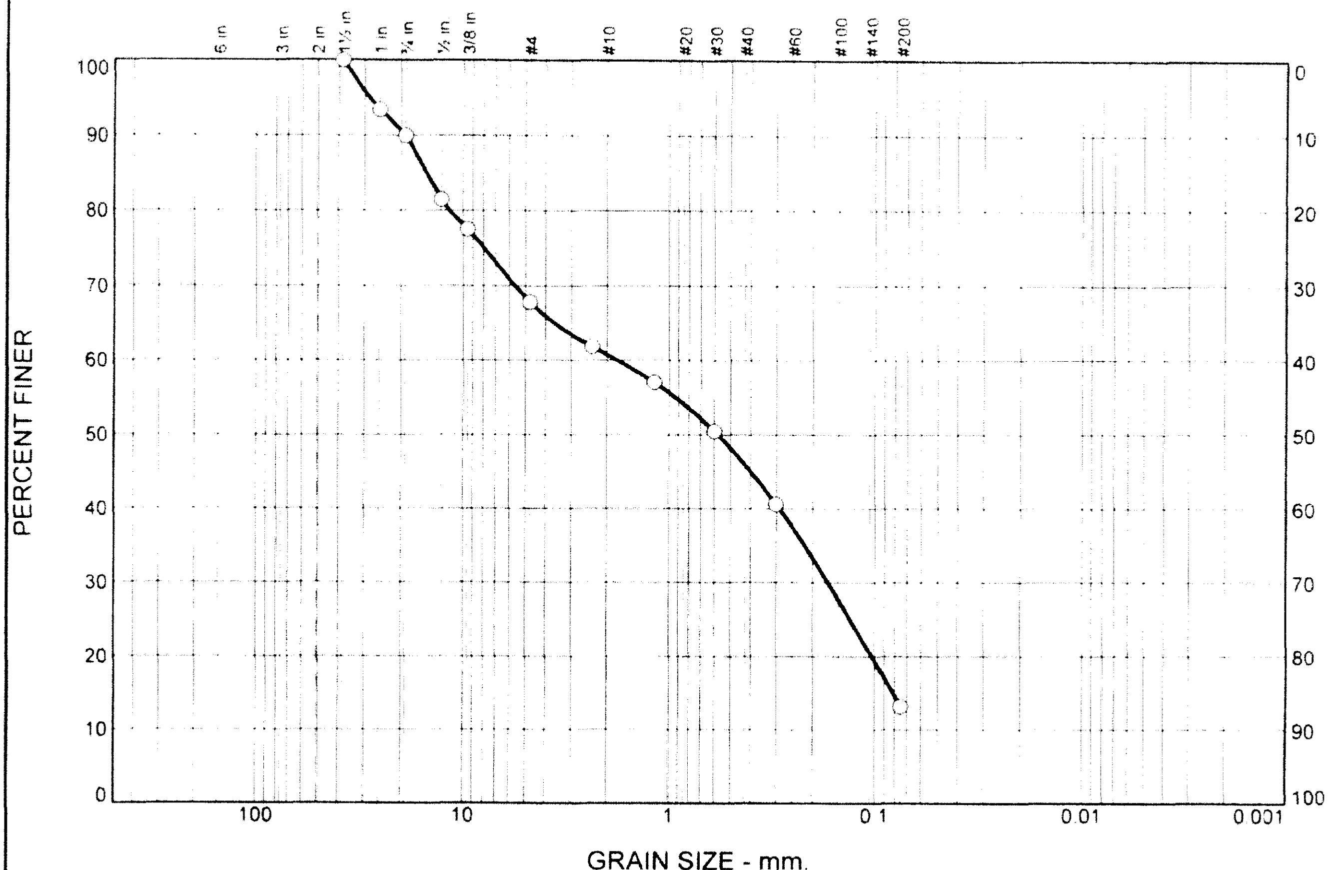
Location: BS-7 **Date:** 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	22.2	7.0	14.8	32.9	13.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	93.4		
3/4"	90.0		
1/2"	81.4		
3/8"	77.5		
#4	67.8		
#8	61.9		
#16	57.0		
#30	50.4		
#50	40.6		
#200	13.1		

* (no specification provided)

Material Description

Silty sand with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 15.0262 D_{60}= 1.7843 D_{50}= 0.5782
D_{30}= 0.1685 D_{15}= 0.0819 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

9.1% Moisture when delivered to lab.

Location: BS-8 **Date:** 3-15-07

SRK Consulting

Elko, Nevada

Client: Graymont Western, Inc.
Project: Cricket Mtn. Baseline
Project No: 138406 **Figure**

Appendix B: Soil Pit Photos

Photo 1: Area around EAQ-1, East Allsop Quarry Area (North).

Photo 2: Soil Pit EAQ-1, note gravel on surface and rocks from pit.

Photo 3: Area around EAQ-2, East Allsop Quarry Area (North).

Photo 4: Soil Pit EAQ-2, note cheatgrass litter covers surface gravel.

Photo 5: Area around EAQ-3, East Allsop Quarry Area (East).

Photo 6: Soil Pit EAQ-3, note cheatgrass litter covers the surface gravels.

Photo 7: Area around EAQ-4, East Allsop Quarry Area (central).

Photo 8: Soil Pit EAQ-4, note the rocks from the pit.

Photo 9: Area around EAQ-5, East Allsop Quarry Area (upper ridge area).

Photo 10: Soil Pit EAQ-5, note reddish color of soil.

Photo 11: Area around BS-1, Big Sage Valley Area (south west)note abundant bunch grass and surface gravel.

Photo 12: Soil Pit BS-1, note rocks and gravel on surface.

Photo 13: Area around BS-2, Big Sage Valley Area (valley floor, southeast).

Photo 14: Soil Pit BS-2, note cheatgrass litter covering surface gravels.

Photo 17: Area around BS-4, Big Sage Valley Area (west), note the big sagebrush and bunchgrass.

Photo 18: Soil Pit BS-4, note surface gravel and rocks from pit.

Photo 19: Area around BS-5, Big Sage Valley Area (northwest), not bunchgrass, black sagebrush, and cheatgrass litter.

Photo 20: Soil Pit BS-5, note cheatgrass litter covering surface gravel.

Photo 21: Area around BS-6, Big Sage Valley (north west), note surface rock, big sagebrush, and bunchgrass.

Photo 22: Road cut – BS-6, note rock layer at approximately 16 inches.

Photo 23: Area around BS-7, Big Sage Valley Area (north central).

Photo 24: Soil Pit BS-7, note cheatgrass litter covering surface gravels.

Photo 25: Area around BS-8, Big Sage Valley Area, note Wyoming big sagebrush and surface gravels.

Photo 26: Soil Pit BS-8, note surface gravels.

SRK Report Distribution Record

Complete this form and include it as the final page for each copy of the report produced.

Report No.	Soil Survey.Report.138406.GNB.VS.20070327.doc
Copy No.	

Name/Title	Company	Copy No	Date	Authorized by
Andrew Rupke	Graymont Western	1 - 4	03/27/07	GNB

Approval Signature:

Appendix ~~C~~D

Reclamation ~~Bond~~ Surety Cost Estimate

SRK Consulting
Engineers and Scientists

Steffen Robertson and Kirsten (U.S.) Inc.
1250 Lamoille Hwy, Suite 520
Elko, NV
USA
89801

email: elko@srk.com
URL: http://www.srk.com
Tel: 775.753.4151
Fax: 775.753-4152

MEMORANDUM

To:	Andrew Rupke, Graymont Western Inc.
Copy to:	Val Sawyer, SRK Consulting
From:	Renee Kockler, SRK Consulting
Date:	September 26, 2008
Project:	Cricket Mountain Mine – Big Sage Revision NOI (138406-300)
Subject:	**Big Sage Reclamation Surety Estimate**

The reclamation surety estimate for the proposed disturbance at the Big Sage Project provides for third-party costs required to reclaim the proposed disturbance as required by Utah Administrative Code R647-4-113. Costs have been provided for earthwork, revegetation, equipment removal, post-reclamation maintenance, equipment mobilization/demobilization, contingency, and escalation.

1.0 Labor, Equipment, and Materials Costs

Equipment operator and labor rates have been separated from equipment costs. Labor rates, including fringe, are based on Davis Bacon Wage Rates for Heavy Construction Projects in Millard County (UT20080011), February 8, 2008. Total equipment costs are based on Wheeler Machinery Company rental rates published for 2008 plus operating costs, which include diesel fuel at $3.55 per gallon, lubrication, and wear items. Overhead and profit are not included in the labor rates or equipment rates because overhead and profit is provided in indirect costs located on the Summary spreadsheet.

Materials costs are separated from equipment and labor costs. Seed costs are based on the approved broadcast seed mix for the Cricket Mountain Mine and are provided by a local seed company.

Seeding costs are based on broadcast seeding or hand seeding and include one laborer. Equipment costs are not associated with broadcast seeding because a manual broadcast seeder is attached to the back of a dozer during the scarifying process.

2.0 Earthwork, Equipment Performance, and Production

Equipment selection is based on suitability and efficiency for each task. Each piece of equipment has standard productivity specifications under varying circumstances, such as grade, operator skill, and rolling resistance; productivity is estimated based on the Caterpillar Handbook, 35th Edition (2005). Equipment fleets and productivities used for reclamation surety calculations are provided in the attached spreadsheets.

3.0 Equipment Mobilization and Demobilization

The *2008 Rental Rate Guide* and freight charge quotes from Wheeler Machinery Company (the CAT Rental Store in Salt Lake City, Utah) are utilized to determine mobilization and demobilization costs. For this mining project, the following equipment is utilized:

- One large dozer (CAT D10);
- Two medium dozers (CAT D9);
- One large excavator (CAT 385);
- One small excavator (CAT 325);
- Four scrapers (CAT 631G);
- One motor grader (CAT 16H);
- One 8,000-gallon water truck (CAT 621E); and
- One 70-ton crane.

Multiple dozers and scrapers are utilized in order to complete active reclamation in a three- to four-month timeframe. The D10 dozer is used for recontouring/regrading as well as knocking down retaining walls and concrete columns, and the D9 dozers are used for recontouring/regrading as well as ripping, scarifying, and assisting with topsoil replacement. A large excavator with a hammer drill is used for concrete foundation demolition. The small excavator is used for excavating the swale and for recontouring storm water berms. The scrapers, motor grader, and water truck are utilized for topsoil replacement; the motor grader is also utilized for minor regrading/recontouring. Conveyor removal is accomplished with the use of a crane and laborers.

4.0 Reclamation Costs for Each Category

Reclamation activities are undertaken for mining located on private and state land. Each spreadsheet details the reclamation activities that occur, and the following sections include descriptions for the physical characteristics, equipment, and revegetation. Assuming sufficient soils are available, the overall site is revegetated to meet 70 percent of the pre-mining vegetative cover.

The Permit Area contains 611.1 acres, of which 515.6 acres is estimated to actually be disturbed. As shown in Notice of Intent (NOI) Figure 3, the Permit Area includes buffer zones (142.6 acres) around each component to account for access and unforeseen disturbance requirements. Estimated actual disturbance within the buffer zones is estimated at 33 percent. As such, the surety calculation only includes reclamation costs for 47 acres associated with buffer zones; however, if more disturbance is planned within the buffer zones, Graymont will increase the surety accordingly prior to disturbance.

Costs are included for 483.1 acres because the quarry bench faces will not be reclaimed (32.5 acres). Table 1 presents the acreages by mine component within the Permit Area, the disturbance acreages, and the reclamation acreages.

Table 1: Big Sage Surface Disturbance

Component	Permit Area (acres)	Disturbance Area (acres)	Reclamation Area (acres)
Quarries	396.3	314.9	282.4
Overburden/Fines Piles	119.3	105.2	105.2
Facility Area	58.5	58.5	58.5
Roads	19.8	19.8	19.8
Topsoil Stockpile	17.2	17.2	17.2
Total	611.1	515.6	483.1

4.1 Overburden/Fines Piles (Spreadsheet A)

Overburden/fines piles are constructed at the overall final reclaimed slope. Final slopes are blended into the surrounding natural topography, where practical as shown in NOI Figure 9. Contouring is estimated to be completed on approximately 90 acres of the overburden/fines piles and the quarry backfill areas.

As shown in NOI Figure 3, the Permit Area consists of 119.3 acres for the overburden/fines piles, which includes 98.2 acres of disturbance from the overburden/fines piles and 21.1 acres of buffer zone around the pile perimeters. Up to 33 percent (seven acres) of the buffer zone for the overburden/fines pile is anticipated to be disturbed as part of mine operations. Therefore, the bonded area for the overburden/fines piles is 105.2 acres. If additional disturbance within the overburden/fines piles buffer zones is planned, the surety will be updated accordingly.

The tops of the overburden/fines piles are covered with a layer of soil and broadcast-seeded. In some areas, the slopes of the overburden/fines piles may be left at angle of repose in an overall configuration which is stable. Dumped overburden is not a source of rockfall. Slopes of the piles that are at an angle that is safe for equipment to work are covered with a layer of soil and seeded. Soil is pushed over the edge of the flat area onto the steep slopes to the extent safe and practical, and seed is cast over the edge of the flat area onto the slopes to the extent safe and practical. Topsoil placement and seed costs are included for the entire disturbance area associated with the overburden/fines piles. Spreadsheet A presents contouring, scarifying, and seeding costs. Costs for ripping/scarifying and seeding the quarry backfill areas are included in Spreadsheet C.

4.2 Yards and Stockpiles (Spreadsheet B)

Spreadsheet B provides reclamation costs for yards and stockpiles. The Facility Area, shown in NOI Figure 6, is treated as a yard for reclamation cost estimation purposes.

For surety calculation purposes, the storm water retention pond and the interior roads within the Facility Area are treated separately from the "yard" portion of the Facility Area. Of the 58.5 acres of disturbance associated with the Facility Area, calculations for reclamation of 10.7 acres associated with interior roads are provided in Spreadsheet D (Haul/Access Roads), and calculations for reclamation of 2.2 acres associated with the storm water retention pond are provided in Spreadsheet E (Miscellaneous).

As shown in NOI Figure 3, the Facility Area contains a level area where buildings, such as the warehouse, maintenance shop, and offices, are located. The remainder of the Facility Area is characterized by small areas of disturbance with "islands" of vegetation. Therefore, limited contouring is required to blend the Facilities Area with surrounding natural topography. For the surety calculation, contouring a volume of 73,568 cy (45.6 acres at an average depth of one foot) is a conservative estimate for blending the Facility Area with surrounding natural topography. Costs for topsoil placement, scarifying, and seeding the Facility Area are included in the surety calculation.

Topsoil is not salvaged from the topsoil stockpile disturbance area during construction activities at the Big Sage Project. Removal of topsoil from the stockpile area for placement on contoured/regraded areas are conducted in such a manner as to produce topography similar to the pre-mining topography and to leave sufficient topsoil to support revegetation without conducting additional earthworks. Therefore, costs for contouring topsoil placement are not included for the topsoil stockpile. Costs for scarifying and seeding the entire topsoil stockpile area are included in the surety calculation.

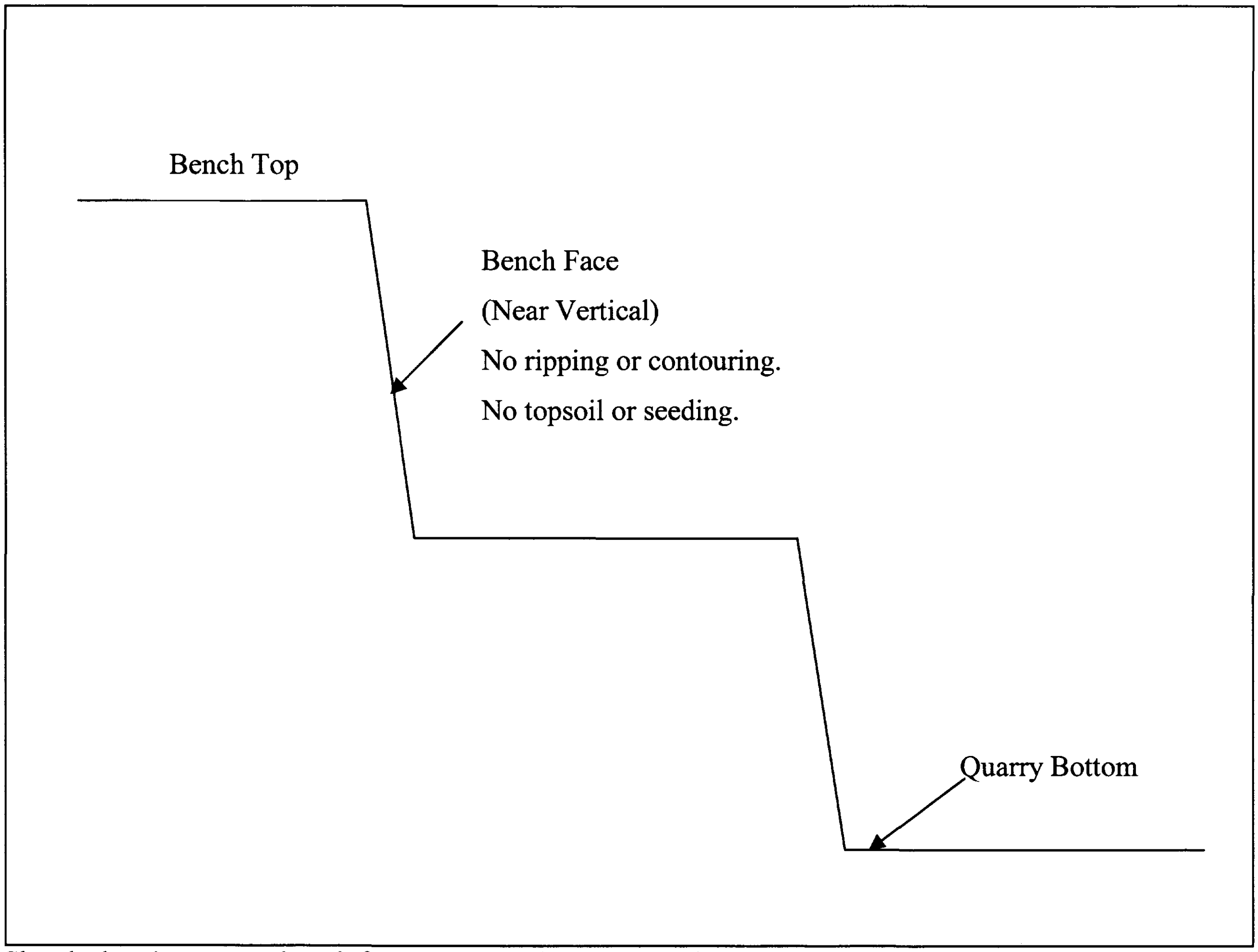
Costs for structure demolition and disposal for structures and buildings in the Facility Area are provided in Spreadsheet E. NOI Figure 6 shows locations of structures and buildings that are demolished, and NOI Figure 9 illustrates that structures and buildings are not present after reclamation. Up to five acres of the Facility Area are covered with two feet of topsoil and/or limestone fines to bury rubblized concrete structures. The location of buried, rubblized concrete is shown in NOI Figure 9, and costs for rubblizing concrete structures are provided in Spreadsheet F.

4.3 Quarries (Spreadsheet C)

For surety calculation purposes, the interior roads within the North Quarry Area are treated as a separate component. Calculations for reclamation of 4.6 acres associated with interior roads in the North Quarry Area are provided in Spreadsheet D (Haul/Access Roads).

As shown in NOI Figure 3, the Permit Area contains 396.3 acres for the quarries, which includes 274.8 acres of quarry disturbance and 121.5 acres of buffer zone around the quarry perimeters. Up to 33 percent (40 acres) of the buffer zone for the quarries is anticipated to be disturbed as part of mine operations. If additional disturbance within the overburden/fines piles buffer zones is planned, the surety will be updated accordingly.

Bench faces in the quarries are nearly vertical as illustrated in the following sketch; therefore, bench faces are not reclaimed. Bench faces comprise approximately 32.5 acres (approximately 10%) of disturbance within the quarry areas. The following sketch illustrates an example of the bench faces that are not reclaimed. Costs are included for reclaiming 282.4 acres within the quarry areas.



Sketch showing quarry bench faces not ripped or contoured.

4.4 Haul Roads (Spreadsheet D)

Haul road locations are shown in NOI Figure 3. Roads without a defined post-mining land use are reclaimed by recontouring/regrading with a CAT D9-class dozer and a motor grader or similar equipment. Regrade volume calculations are shown on Spreadsheet D1. Road surfaces are ripped and broadcast-seeded.

4.5 Miscellaneous (Spreadsheet E)

Structures within the Permit Area include pipelines, power lines, substations, diesel fuel storage, gasoline storage, explosives magazines, and water storage and are shown on NOI Figure 6. NOI Figure 9 illustrates that buildings and structures do not remain within the Permit Area after reclamation. Structure demolition and disposal costs are determined from 2007 RS Means Heavy Construction Cost Data; power line and substation removal costs are provided by Sierra Pacific Power Company. Overhead and profit are not included in the demolition and removal costs because overhead and profit costs are included in the Summary spreadsheet as an indirect cost.

Revegetation monitoring costs assume a range specialist makes a trip to the Permit Area once per year for a period of three years to determine revegetation success. Costs associated with the range specialist site review and report writing are based upon an hourly rate of $65 for 40 hours per year. Travel costs to the Permit Area are estimated at 50.5 cents per mile and 400 miles round trip from Salt Lake City, Utah.

Maintenance costs are based on revegetation of ten percent of acres vegetated during active reclamation. The amount of required revegetation is based on historical reclamation experience at the Cricket Mountain Mine. During active reclamation, 483.1 acres of disturbance are seeded; therefore, an estimated 48 acres are expected to require reseeding.

RS Means Heavy Construction Cost Data is used to estimate solid waste removal, hazardous waste removal, and hydrocarbon contaminated soils removal. Dumpster rental costs are based on renting one dumpster for three months and removing the dumpster at the end of active reclamation. Approximately 30 cy of solid waste is estimated to be removed from the Permit Area. Up to 4,000 gallons of waste oil are transported from the Permit Area to nearby facilities in accordance with current practice. The nearby facilities are located approximately seven miles from the Permit Area. Costs are included for removal of up to 25 cy of hydrocarbon contaminated soil to a landfill during active reclamation.

Costs for recontouring and revegetating storm water berms and ditches are based on utilizing a CAT 325 excavator, and costs for recontouring and revegetating the storm water retention pond are based on utilizing a D10 dozer. The diversion ditch located north of the North Overburden/Fines Pile remains as a post-mining feature; therefore, costs for recontouring this ditch are not included in the surety calculation. For surety calculation purposes, the storm water berms are estimated to be 1,640 feet long and three feet high with side slopes at 2H:1V. For surety calculation purposes, the diversion ditches are estimated to be 3,740 feet long by two feet wide at the bottom by two feet deep with side slopes of 2H:1V. To help facilitate pre-mining flow patterns, a swale is excavated to approximate the pre-mining topography within the topsoil stockpile disturbance area. The swale is approximately 985 feet long, four feet wide at the bottom, and two feet deep with 2.5H:1V side slopes. NOI Figure 7 provides the location of storm water controls that are present during operations, and NOI Figure 9 provides the location of storm water controls that are present after reclamation.

NOI Figure 6 provides conceptual conveyor locations during operations. Costs are provided for removing these sections of conveyor assuming that dismantled conveyors are removed from the Permit Area by a scrap dealer or purchaser on scrap dealer-owned trucks. A 70-ton crane is utilized to dismantle conveyor sections, and conveyor dismantling costs include the crane rental cost, the crane operator, and four laborers. Equipment hours are estimated based on two hours per 100-foot section, with a minimum of two hours per section, and equipment hours are rounded to the nearest whole hour. Conveyor footing rubblization costs are provided in Spreadsheet F.

4.6 Foundations (Spreadsheet F)

Concrete foundation and footing demolition costs include rubblization utilizing a CAT 385 excavator with an 11,000 foot-pound hydraulic impact hammer. Estimated concrete volumes are provided by an engineering firm and are subject to change pending final design and actual construction. Rubblized concrete is buried under two feet of topsoil or limestone fines as provided in Spreadsheet B and described in NOI Section 4.2. The location of buried, rubblized concrete structures is shown in NOI Figure 9.

4.7 Building Demolition (Spreadsheet G)

Building demolition costs are based on RS Means Heavy Construction Cost Data and include haulage from the Permit Area. Overhead and profit is provided in the Summary spreadsheet as an indirect cost. To provide a conservative cost estimate, building dimensions are rounded to the nearest foot and assume square or rectangular building shapes even though various building shapes may be utilized.

5.0 Summary

The reclamation cost summary spreadsheet provides a summary of reclamation by Project component. Individual costs are provided for equipment, labor, and materials. General site clean-up is estimated at one percent of the total direct costs. Indirect costs include contractor overhead and profit of ten percent and a contingency of ten percent. Escalation costs for five years at a rate of 3.2 percent per year are also included for a total surety estimate of $2,114,753.

6.0 References

Caterpillar. (2005). *Caterpillar Performance Handbook*, Edition 35. Caterpillar, Inc., Peoria, Illinois.

RS Means (2007). *Means Heavy Construction Cost Data,* 21st Annual Edition.

Wheeler CAT. (2008). *Rental Rate Guide.*

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GRAYMONT WESTERN U.S., INC.
CRICKET MOUNTAIN PROJECT - BIG SAGE
RECLAMATION COST SUMMARY

	SPREADSHEET/PROJECT COMPONENT	EQUIPMENT	LABOR	MATERIALS	TOTALS	PLAN VIEW ACRES
A	Overburden/Fines Piles	$224,369	$38,512	$10,012	$272,894	105.2
B	Yards and Stockpiles	$146,183	$24,014	$5,977	$176,174	62.8
C	Quarries	$532,662	$93,381	$26,439	$652,481	277.8
D	Haul/Access Roads	$108,448	$17,501	$3,341	$129,290	35.1
E	Miscellaneous	$29,357	$35,687	$5,921	$70,965	2.2
F	Concrete Foundation Demolition	$9,880	$1,118	$0	$10,998	NA
G	Building Demolition and Disposal	$60,480	$50,400	$0	$110,880	NA
	Subtotal	$1,111,379	$260,613	$51,690	$1,423,682	483.1
	General Site Clean-Up (1% of total: RS Means, 2007, 017413.200040, Site Work and Landscape Cost Data, 26th Edition)				$14,237	
	Mobilization/Demobilization				$67,579	
	Total Direct Costs				$1,505,497	
	Contractor Overhead and Profit (10%)				$150,550	
	Contingency (10%)				$150,550	
	Total with Indirect Costs				$1,806,597	
	Year 1 Escalation (3.2%)				$57,811	
	Year 2 Escalation (3.2%)				$59,661	
	Year 3 Escalation (3.2%)				$61,570	
	Year 4 Escalation (3.2%)				$63,540	
	Year 5 Escalation (3.2%)				$65,574	
	GRAND TOTAL				$2,114,753	483.1
					$/acre	$4,377.65
	Total Proposed Bond				$2,114,753	

GRAYMONT WESTERN U.S., INC.
CRICKET MOUNTAIN PROJECT - BIG SAGE
RECLAMATION COST SUMMARY

SRK Consulting

Hourly Rates for Labor

Operator	Base Rate (1)	FICA (7.65% base)	SIIS (12.4%)	UIP (3% base rate)	Total ($)
Power Equipment Operator	$24.09	$1.84	$2.99	$0.72	$29.64
Crane Operator	$37.60	$2.88	$4.66	$1.13	$46.27
Laborer	$13.46	$1.03	$1.67	$0.40	$16.56
Foreman (2)	$37.60	$2.88	$4.66	$1.13	$46.27

(1) Base rates include fringe and are from Davis Bacon Wage Rates for Heavy Construction Projects in Millard County (UT20080011), February 8, 2008.
(2) Supervisor rate is equal to highest power equipment operator rate in Davis Bacon Wage Rates for Heavy Construction Projects in Millard County (UT20080011), February 8, 2008.

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE	TOTAL HOURLY RATE	NOTES	RENTAL HOURLY RATE	FUEL/LUBE/WEAR HOURLY RATE
CAT D10T BULLDOZER	$290.52	1	$204.55	$85.97
CAT D9R/T BULLDOZER	$213.93	1	$146.59	$67.34
CAT 385CL EXCAVATOR	$233.32	1	$155.11	$78.21
CAT 325CL EXCAVATOR	$78.65	1	$46.59	$32.06
CAT 631G SCRAPER	$189.92	1	$113.07	$76.85
CAT 16H MOTORGRADER	$166.73	1	$110.80	$55.93
CAT 621F 8KGAL WATER WAGON	$108.89	1	$71.02	$37.87
70-TON CRANE	$82.53	2	$71.88	$10.65

NOTES: Costs based on hours used
1. SOURCE: 2008 Wheeler CAT Rental Rates (4-week rental rates divided by 176 hours.)
2. SOURCE: Quote from Perry Crane, April 2007.

SEED COST ESTIMATE

SEED AMENDMENTS	APPLICATION RATE (lb PLS/ac)	COST ($/lb)	COST ($/ac)
Hycrest' crested wheat grass	1.44		
Luna pubescent wheat grass	2.88		
Bozoisky Russian wildrye	2.88		
Koshia Prostrata	0.48		
Yellow sweetclover	1.44		
Shadscale - VNS	1.44		
Fourwing Saltbrush - VNS	1.44		
Subtotal	**12.00**		
Total $/acre			**$90.00**
Total $/acre w/ 5.75% sales tax			**$95.18**

Seed cost estimate as per Granite Seed, March 30, 2007 quote.
Individual seed costs were not provided.

EQUIPMENT MOBILIZATION TABLE

EQUIPMENT TYPE	RATE	Max Number	Total $
CAT D10T BULLDOZER (1)	$2,789.28	1	$2,789.28
CAT D9R/T BULLDOZER	$1,500.00	2	$3,000.00
CAT 385CL EXCAVATOR (2)	$14,700.00	1	$14,700.00
CAT 325CL EXCAVATOR	$900.00	1	$900.00
CAT 631G SCRAPER	$1,700.00	4	$6,800.00
CAT 16H MOTORGRADER	$1,200.00	1	$1,200.00
CAT 621E 8KGAL WATER WAGON	$900.00	1	$900.00
70-TON CRANE (5)	$3,500.00	1	$3,500.00
		Total	$33,789.28

(1) Includes disassembly to ship and re-assembly at site - 30 hours total as per Cashman Equipment (Rer
(2) Includes permits, 2 pilot cars, fall off load, assembly and disassembly of the bucket and stick per Wheeler Machinery Co. (4
(3) Includes permits, 2 pilot cars, fall off load, assembly and disassembly of bucket and cab per Wheeler Machinery Co. (4/9/C
(4) Includes permits, 2 pilot cars, highway patrol escort, assembly and disassembly of rear duals per Wheeler Machinery Co. (
(5) Perry Crane, 2007

EQUIPMENT FUEL, LUBE, AND WEAR EQUIPMENT TYPE	PM COST PER HOUR (1)	UNDERCARRIAGE OR TIRES COST PER HOUR (2	GROUND OOLS CONSUMPTIO COST PER HOUR (3)	FUEL USE RATE GAL/HR	FUEL COST PER GALLON $3.55	TOTAL HOURLY EQUIPMENT OPERATING COST
CAT D10T BULLDOZER	$7.06		$15.01	18.00	$63.90	$85.97
CAT D9R/T BULLDOZER	$6.00		$10.75	14.25	$50.59	$67.34
CAT 385CL EXCAVATOR	$6.47		$9.61	17.50	$62.13	$78.21
CAT 325CL EXCAVATOR	$4.43		$4.20	6.60	$23.43	$32.06
CAT 631G SCRAPER	$5.70	$11.91	$5.99	15.00	$53.25	$76.85
CAT 16H MOTORGRADER	$4.78	$9.78	$14.75	7.50	$26.63	$55.93
CAT 621F 8KGAL WATER WAGON	$5.03	$17.55	N/A	9.25	$32.84	$37.87
70-TON CRANE	N/A		N/A	3.00	$10.65	$10.65

NOTES: Costs based on hours used

1. PM Source: July 2007 Cashman Equipment Rental Rate, Elko, NV.
2. Undercarriage Source: D & D Tire, Inc. 6/8/07.
3. Ground Engaging Tools Consumption Source: CAT Historical Data.
4. Fuel Use Source: Caterpillar Handbook, Edition 35, Ch. 20; or estimated average for smaller vehicles.

EQUIPMENT FUEL, LUBE, AND WEAR EQUIPMENT TYPE	# OF TIRES PER UNIT	COST PER TIRE	TIRE COST PER UNIT	TIRE LIFE (HOURS)	HOURLY TIRE COST PER UNIT
CAT D10T BULLDOZER	N/A				
CAT D9R/T BULLDOZER	N/A				
CAT 385CL EXCAVATOR	N/A				
CAT 325CL EXCAVATOR	N/A				
CAT 631G SCRAPER	4	$11,908.75	$47,635.00	4,000	$11.91
CAT 16H MOTORGRADER	6	$5,703.84	$34,223.04	3,500	$9.78
CAT 621F 8KGAL WATER WAGON	4	$35,107.20	$140,428.80	8,000	$17.55
70-TON CRANE	N/A				

NOTES: Costs based on hours used

1. Unit Cost Basis: Cost per Set.
2. Cost Basis: Total cost for all required tires.
3. Tire Cost Source: D & D Tire, Inc. 6/8/07
4. Tire Wear Source: Caterpillar Handbook, Edition 35; Ch. 20

CRICKET MOUNTAIN PROJECT - BIG SAGE

Revised: 9/26/2008

EARTHWORK / RECONTOURING

I. CATERPILLAR D9R BULLDOZER - UNIVERSAL BLADE PUSH CAT

SRK Consulting

		PUSH CAT	
	Production Rate		
(a)	Material Density (lb/cy)		2600
(a)	Average Dozing Distance (ft)		50
(e)	Maximum Production for dozing distance (cy/hr)		2200
	Correction Factors		
(b)	Operator	Average	0.75
(b)	Material	Average	1
(b)	Job Efficiency	50 min/hr	0.83
(c)	Weight Correction		0.884615385
(b)	Grade Correction	0 : 1	1
(d)	Total Correction Factor		0.55
	Corrected production (cy/hr)		1211
	Cost Rates		
	Bulldozing		$213.93
	Operator		$29.64
	Total Equipment		$243.57

(a) Assumed 96 lbs/cu ft
(b) Acquired from the Caterpillar Performance Handbook, 35th Edition
(c) Determined using the Caterpillar Performance Handbook assuming a standard density of 2300 lb/cy : (2300 lb/cy)/ Actual Density) = Weight Correction Factor
(d) Total Correction Factor = Product (all correction factors)
(e) D9R will be used as a push cat and is reliant on the scrapers for production

EARTHWORK / RECONTOURING

Revised: 9/26/2008

II. CATERPILLAR D9R BULLDOZER - UNIVERSAL BLADE & MULTI-SHANK

		FLAT TERRAIN		SLOPED TERRAIN +3 : 1		RIPPING	
	Production Rate						
(a)	Material Density (lb/cy)		2600		2600	Ripper Width (ft)	7
(a)	Average Dozing Distance (ft)		100		150	Effective Ripping Width (ft	10
(b)	Maximum Production for dozing distance (cy/hr)		1300		950	Operating Speed (mph)	1
	Correction Factors					Travel Length (ft/ac)	4356
(b)	Operator	Average	0.75		0.75	Two passes required	0.5
(b)	Material	average	1	loose	1.2	Production rate (ac/hr)	0.61
(b)	Job Efficiency	50 min/hr	0.83		0.83		
(c)	Weight Correction		0.885		0.885		
(b)	Grade Correction	0 : 1	1	3 : 1	1.66		
(d)	Total Correction Factor		0.55		1.10		
	Corrected production (cy/hr)		716		1042		
	Cost Rates						
	Bulldozing		$213.93		$213.93		$213.93
	Operator		$29.64		$29.64		$29.64
	Total Equipment		$243.57		$243.57		$243.57

(a) Assumed 96 lbs/cu ft
(b) Acquired from the Caterpillar Performance Handbook, 35th Edition
(c) Determined using the Caterpillar Performance Handbook assuming a standard density of 2300 lb/cy : ((2300 lb/cy)/ Actual Density) = Weight Correction Factor
(d) Total Correction Factor = Product (all correction factors)

EARTHWORK / RECONTOURING
III. CATERPILLAR D10T BULLDOZER - UNIVERSAL BLADE & MULTI-SHANK

		FLAT TERRAIN		SLOPED TERRAIN +3 : 1		RIPPING	
	Production Rate						
(a)	Material Density (lb/cy)		2600		2600	Ripper Width (ft)	7
(a)	Average Dozing Distance (ft)		100		150	Effective Ripping Width (ft	10
(b)	Maximum Production for dozing distance (cy/hr)		1800		1300	Operating Speed (mph)	1
	Correction Factors					Travel Length (ft/ac)	4356
(b)	Operator	Average	0.75		0.75	Two passes required	0.5
(b)	Material	compacted alluvium	1	loose	1.2	Production rate (ac/hr)	0.61
(b)	Job Efficiency	50 min/hr	0.83		0.83		
(c)	Weight Correction		0.884615385		0.884615385		
(b)	Grade Correction	FLAT	1	3 : 1	1.66		
(d)	Total Correction Factor		0.55		1.10		
	Corrected production (cy/hr)		991		1426		
	Cost Rates						
	Bulldozing		$290.52		$290.52		$290.52
	Operator		$29.64		$29.64		$29.64
	Total Equipment		$320.16		$320.16		$320.16

(a) Assumed 96 lbs/cu ft.
(b) Acquired from the Caterpillar Performance Handbook, 35th Edition
(c) Determined using the Caterpillar Performance Handbook assuming a standard density of 2300 lb/cy : ((2300 lb/cy)/ Actual Density) = Weight Correction Factor
(d) Total Correction Factor = Product (all correction factors)

EARTHWORK / RECONTOURING - 631G SCRAPER
IV. CATERPILLAR 631G SCRAPER

		Topsoil Replacement	
	Production Rate		
(b)	Capacity (cu. yd.)		31
(a)	Average Haul Distance (ft)		2600
	Cycle Time		
(b)	Loading Time (min)		0.6
(b)	Spreading Time (min)		0.7
(b)	Loaded Haul Time (min)	8% Grade + 2% RR	3.9
(b)	Empty Haul Time (min)	-8% Grade + 2% RR	1.5
	Total time (min)		6.7
	Cycles per Hour	(min/hr)/(min/cycle)	8.96
	Production Rate (cy/hr)	Capacity*(Cyc/hr)	278
	Correction Factors		
(b)	Operator	Average	0.75
(b)	Load Factor	Earth - Dry, Packed	0.9
(b)	Job Efficiency	50 min/hr	0.86
(c)	Total Correction Factor		0.58
	Corrected production rate (cy/hr)		161
	Cost Rates		
	Scraper		$189.92
	Operator		$29.64
	Total Equipment		$219.56

(a) Internal estimation based on known spoil and topsoil pile locations
(b) Acquired from the Caterpillar Performance Handbook, 35th Edition
(c) Total Correction Factor = Product (all correction factors)

EARTHWORK / RECONTOURING

V. CATERPILLAR 16 - H GRADER

Revised: 9/26/2008

			SCARIFYING	BLADING
	Production Rate			
	Blade/Scarifying Width (ft)		14	16
	Eff. Blade/Scarifying Width (ft)		14	16
	Operating Speed (mph)		1.5	2.5
	Travel Length (ft/ac)	(sf/ac)/eff. scar. width	3111	2722.5
	Production Rate (acre/hr)	(speed*dist)/trav. lgth	1.82	3.03
	Correction Factors			
(a)	Operator	Average	0.75	0.75
(a)	Job Efficiency	50 min/hr	0.83	0.83
(b)	Total Correction Factor		0.62	0.62
	Corrected Production Rate (ac/hr)		1.13	1.88
	Cost Rates			
	Grader		$166.73	$166.73
	Operator		$29.64	$29.64
	Total Equipment Cost		$196.38	$196.38

(a) Acquired from the Caterpillar Performance Handbook, 35th Edition
(b) Total Correction Factor = Product (all correction factors)

EARTHWORK / RECONTOURING

VI. CATERPILLAR 325CL EXCAVATOR

Revised: 26-Sep-08

		DEMOLITION	REGRADING
	Production Rate		
(a)	Capacity (lcy)		2.5 LCY
	Fill Factor		0.75
	Average Bucket Fill		1.88
	Average Production (Cat Handbook for 1.88 LCY bucket)		338 LCY/hr
	Job Efficiency		0.83
	Production Factor		0.5
	Average Production		140 LCY/hr
	Cycles per Hour		
	Cost Rates		
	Excavator ($/hr)		$78.65
	Operator ($/hr)		$29.64
	Total Operating Cost ($/hr)		$108.29

(a) Acquired from the Caterpillar Performance Handbook, 35th Edition
(b) Estimations based on actual experience

VII. REVEGETATION / STABILIZATION

Revised: 9/26/2008

Production Rate	BROADCAST SEEDING
	Manual Broadcast Seeder (a)
Effective Seeding Width (ft)	15
Operating Speed (mph)	0.75
Travel Length (ft/ac)	2904
Production Rate (ac/hr)	0.6
Seed Equipment Rate	$0.00
Amendment Equipment Rate	
Seed and Amendment Equipment Rate	$0.00
Labor	$16.56
Seed Mixture ($/ac)	$95.18
Amendments ($/acre)	

(a) Attach a manual broadcast seeder to the back of a dozer during the scarifying process; therefore, no additional equipment costs for manua

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EARTHWORK / RECONTOURING EQUIPMENT COMBINATIONS VIII.

Revised: 26-Sep-08

Equipment	Total Productivity	Total Cost Equipment/Hour	Total Cost Labor/Hour
Contour/Regrade Combinations			
1 D10R-3 each; D9R-1	5320	$1,085.49	$118.57
2 1-D9R; 1-16H Grader (all production from dozer)	716	$380.66	$59.29
3 1-D9R dumps 150 ft push	1042	$213.93	$29.64
Topsoil Replacement / Fill Combinations			
1 631 Scraper-4 each; 16H Motor Grader; 8000-gallon Water Wagon; D9R Dozer-1 each	644	$1,249.22	$207.50
Rip			
1 D9R Dozer- acres per hour	0.61	$213.93	$29.64
Scarify Combinations			
1 1-D9R	0.61 ac/hr average	$213.93	$29.64
Fill Combinations			
1 631 Scraper-4 each; 16H Motor Grader; 8000-gallon Water Wagon; D9R Dozer-1 each	644	$1,249.22	$207.50

FOUNDATION/CONCRETE DEMOLITION
IX. 385CL EXCAVATOR WITH HYDRAULIC HAMMER

Revised: 26-Sep-08

	Production Rate		Model 180 hydraulic hammer		
(a)	Material Density (lb/cy)		assume concrete has average compressive strength of 25,000 psi		
(b)	Average production		950 CY/8 hr		CAT handbook average production for massive formation
(b)					
	Average operator		0.75		
	50 min/hour		0.83		
	Total		0.62		
	Corrected production		591 CY/8 hr		
			73.9 CY/hr		
	Cost Rates				
				Per CY	
	Excavator ($/hr)		$233.32	$3.16	
	Operator ($/hr)		$29.64	$0.40	
	Total Operating Cost ($/hr)		$263.00	$3.60	
	D10N for clean-up, smoothing and knock-down	equipment/hr	$290.52	$3.93	
		labor/hr	$29.64	$0.40	
	Total Cost Equipment			$7.09	
	Total Cost Labor			$0.80	

(a) Assumed 96 lbs/cu ft.
(b) Acquired from the Caterpillar Performance Handbook, 35th Edition

CRICKET MOUNTAIN PROJECT - BIG SAGE

SRK Consulting

Overburden/Fines Piles

Spreadsheet A

Revised: 9/26/2008

Overburden Pile Name		Map Acres	Flat Surface Acres	Map Slope Acres	Actual Slope Acres	Regrade Volume
North Overburden / Fines Pile (includes 10.5 acres of buffer zones)		22.9	0.0	22.9	24.7	0
Central Overburden / Fines Pile (includes 10.6 acres of buffer zones)		96.4	0.0	96.4	104.0	0
	Subtotal	119.3	0.0	119.3	128.7	0
Scarify acres	84.2					
Topsoil/Reveg acres	105.2					

*33% of the buffer zones will be disturbed, ripped/scarified, and revegetated.

	Contour/Regrade	Topsoil Replacement	Rip/Scarify	Fill	Seed/Amendments	TOTALS
Equipment	(1)	(2)	(3)		(4)	-
Quantity	145,200 CY	84,861 CY (5)	84.2 AC	0 CY	105.2 AC	-
Production Rate	1,042 CY/HR	644 CY/HR	0.61 AC/HR	644 CY/HR	0.6 AC/HR	-
Time Required	139 HR	132 HR	139 HR	0 HR	174 HR	-
Unit Cost						
Equipment	213.93 $/hr	1,249.22 $/hr	213.93 $/hr	$1,249.22 $/hr	$0.00 $/hr	-
Labor	29.64 $/hr	207.50 $/hr	29.64 $/hr	$207.50 $/hr	$16.56 $/hr	-
Seed	0.00 $/ac	0.00 $/ac	0.00 $/ac	0.00 $/ac	$95.18 $/ac	-
Cost/Unit Area ($/ac)	-	-		-	$123	-
Cost/Unit Volume ($/cy)	$0.23	$2.27	-	-	-	-
Equipment Cost	$29,736	$164,897.44	$29,736	$0	$0	$224,369
Labor Cost	$4,120	$27,389.90	$4,120	$0	$2,882	$38,512
Seed Cost	$0	$0	$0	$0	$10,012	$10,012
TOTAL COSTS	$33,856	$192,287	$33,856	$0	$12,894	**$272,894**

Manpower Sub-total		Equipment Sub-total		Material Costs			
Earthwork	$35,631	Earthwork	$224,369	Earthwork	$0	Total Cost ($/AC):	$2,287
Revegetation	$2,882	Revegetation	$0	Revegetation	$10,012	119.3 plan view acres	

(1) One D9R Dozer used to blend the overburden piles with surrounding topography - approximately 90 acres includes the quarry backfill areas.
(2) Four Scrapers, one Motor Grader, one water truck and one D9R.
(3) D9R. Top of piles will be ripped, appx. 84.2 acres for both piles.
(4) Broadcast Seeding and Hand Seeding
(5) Equals 6 inches of topsoil over entire dump reveg acres

CRICKET MOUNTAIN PROJECT - BIG SAGE *SRK Consulting*

Yards and Stockpiles

Spreadsheet B

Revised: 9/26/2008

Facility Name	Acres
Topsoil Stockpile	17.2
Facility Area	45.6
Total Acres	62.8

*Interior road acreage (10.7 acres) was placed in the haul roads category (Sheet D).
*Evaporation pond acreage (2.2 acres) was placed in the stormwater controls cateogry (Sheet E).
*Facility demolition and removal costs are provided in the structure demolition and disposal cateory (Sheet E).

	Earthwork				Revegetation	
	Contour/Regrade	Topsoil Replacement	Rip/Scarify	Cover	Seed/Amendments	TOTAL
Equipment	(1)	(2)	(3)	(4)	(5)	-
Quantity	73,568 CY	36,784 CY (6)	62.8 AC	16,133 CY	62.8 AC	-
Production Rate	991 CY/HR	644 CY/HR	0.61 AC/HR	644 CY/HR	0.6 AC/HR	-
Time Required	74 HR	57 HR	104 HR	25 HR	104 HR	-
Unit Cost						
Equipment	290.52 $/hr	1,249.22 $/hr	213.93 $/hr	1249.22 $/hr	$0.00 $/hr	-
Labor	29.64 $/hr	207.50 $/hr	29.64 $/hr	207.50 $/hr	$16.56 $/hr	-
Seed	0.00 $/ac	0.00 $/ac	0.00 $/ac	0.00 $/ac	$95.18 $/ac	-
Cost/Unit Area ($/ac)	-	-	$403.36	-	$123	-
Cost/Unit Volume ($/cy)	$0.32	$2.26	-	$2.26	-	-
Equipment Cost	$21,498	$71,206	$22,248	$31,231	$0	$146,183
Labor Cost	$2,194	$11,827	$3,083	$5,187	$1,723	$24,014
Seed Cost	$0	$0	$0	$0	$5,977	$5,977
TOTAL COSTS	$23,692	$83,033	$25,331	$36,418	$7,699	**$176,174**

Manpower Sub-total		Equipment Sub-total		Material Costs			
Earthwork	$22,291	Earthwork	$146,183	Earthwork	$0	Total Cost ($/AC):	$2,805
Revegetation	$1,723	Revegetation	$0	Revegetation	$5,977	62.8 plan view acres	

(1) D10R Dozer, 1 each; only recontour the facilities area.
(2) 631 Scraper, 4 each; 16H Motor Grader, 1 each; 8000 gal Water Wagon, 1 each; D9R Dozer, 1 each.
(3) D9R Dozer, 1 each.
(4) 631 Scraper, 4 each; 16H Motor Grader, 1 each; 8000 gal Water Wagon, 1 each; D9R Dozer, 1 each. Volume is equal to 2 feet of growth media and/or fines (to cover broken-up concrete) over 5 acres of Facility Area.
(5) Broadcast Seeding
(6) Topsoil placement only in Facility Area with 6 inches.

CRICKET MOUNTAIN PROJECT - BIG SAGE **SRK Consulting**

Quarries

Spreadsheet C

Facility Name	Acres	
Big Sage North Quarry Area (includes 42.0 acres of buffer zones)	112.2	Revised: 9/26/2008
Big Sage South Quarry Area (includes 79.5 acres of buffer zones)	279.5	*Interior road acreage (4.6 acres) was placed in the haul roads category (Sheet D).
	0	*Bench faces comprise 32.5 acres.
	0	
	0	*33% of buffer zones will be disturbed, ripped/scarified, and revegetated.
Subtotal Acres	391.7	Topsoil/Reveg Ac 277.8

		Earthwork Topsoil Placement		Ripping		Seed/Amendments		TOTAL
Equipment		(1)		(2)		(3)		
Quantity		224,088	CY (4)	277.8	ac	277.8	Acres	
Production Rate		644	CY/HR	0.61	CY/HR	0.6	AC/HR	
Time Required		348	HR	458	HR	459	HR	
Unit Cost								
	Equipment	$1,249.22	$/hr	$213.93	$/hr	$0.00	$/hr	
	Labor	$207.50	$/hr	$29.64	$/hr	$16.56	$/hr	
	Material	$0.00	$/ac	$0.00	$/ac	$95.18	$/ac	
Cost/Unit Area ($/ac)								
Cost/Unit Volume ($/CY)		$2.26		$401.57				
Equipment Cost		$434,683		$97,979		$0		$532,662
Labor Cost		$72,202		$13,576		$7,602		$93,381
Seed Cost		$0		$0		$26,439		$26,439
TOTAL COSTS		$506,885		$111,555		$34,041		**$652,481**

Manpower Subtotal		Equipment Sub-total		Materials/Subcontracts Sub-total			
Earthwork	$85,778	Earthwork	$532,662	Earthwork	$0	Total Cost ($/AC):	$1,665.77
Revegetation	$7,602	Revegetation	$0	Revegetation	$26,439	391.7	plan view acres

(1) 631 Scraper, 4 each; 16H Motor Grader, 1 each; 8000 gal Water Wagon, 1 each; D9R Dozer, 1 each.
(2) Quarry bottoms and bench tops to be smoothed and ripped with D9R. South Quarry contains approximately 32.5 acres of bench faces, which will not have topsoil placement and seed. Includes costs for the quarry backfill areas.
(3) Broadcast seeding and hand seeding. Includes costs for the quarry backfill areas.
(4) Topsoil thickness of 6 inches.

CRICKET MOUNTAIN PROJECT - BIG SAGE

SRK Consulting

Haul/Access Roads

Spreadsheet D

Revised: 9/26/2008

Facility Name	Acres
Haul/Access Roads	19.8
Interior Roads	15.3
Total	35.1

* Includes 10.7 acres from the Facility Area and 4.6 acres from the quarry areas.

	Earthwork					Revegetation	
	Contour/Regrade	Topsoil Replacement	Rip	Scarify	Fill	Seed	TOTAL
Equipment	(1)	(2)	(3)	(4)	(5)	(6)	-
Quantity	139,824 CY	28,314 CY (7)	35.1 AC	35.1 AC	0 CY	35.1 AC	-
Production Rate	1,042 CY/HR	644 CY/HR	0.61 AC/HR	0.61 AC/HR	400 CY/HR	0.6 AC/HR	-
Time Required	134 HR	44 HR	58 HR	58 HR	0 HR	58 HR	-
Unit Cost							
Equipment	213.93 $/hr	1,249.22 $/hr	213.93 $/hr	213.93 $/hr	$/hr	$0.00 $/hr	-
Labor	29.64 $/hr	207.50 $/hr	29.64 $/hr	29.64 $/hr	$/hr	$16.56 $/hr	-
Seed	0.00 $/ac	0.00 $/ac	0.00 $/ac	0.00 $/ac	0.00 $/ac	$95.18 $/ac	-
Cost/Unit Area ($/ac)	-	-	$402.48	-	-	$123	-
Cost/Unit Volume ($/cy)	$0.23	$2.26	-	-	-	-	-
Equipment Cost	$28,666	$54,966	$12,408	$12,408	$0	$0	$108,448
Labor Cost	$3,972	$9,130	$1,719	$1,719	$0	$961	$17,501
Seed Cost	$0	$0	$0	$0	$0	$3,341	$3,341
TOTAL COSTS	$32,638	$64,096	$14,127	$14,127	$0	$4,301	**$129,290**

Manpower Sub-total		Equipment Sub-total		Material Costs			
Earthwork	$16,541	Earthwork	$108,448	Earthwork	$0	Total Cost ($/AC):	$3,683
Revegetation	$961	Revegetation	$0	Revegetation	$3,341	35.1 plan view acres	

(1) D9R Dozer, 1 each; 16H Motor Grader, 1 each.
(2) 631 Scraper, 4 each; 16H Motor Grader, 1 each; 8000 gal Water Wagon, 1 each; D9R Dozer, 1 each.
(3) D9R Dozer, 1 each.
(4) D9R Dozer, 1 each.
(5) D9R Dozer, 1 each.
(6) Broadcast Seeding
(7) Topsoil placement volume based on 6 inch depth.

CRICKET MOUNTAIN PROJECT - BIG SAGE

SRK Consulting

Road Regrade Volumes

Spreadsheet D1

Revised: 9/26/2008

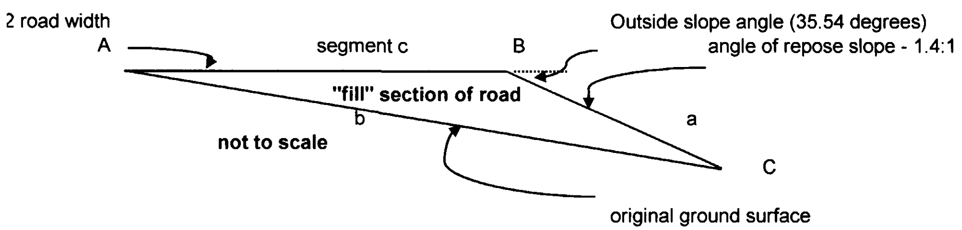
Input Parameters

Outside slope		
	35.54 degrees	1.4 slope

Segment Length (feet)	Segment Width (feet)	Section Original Ground Surface Slope	Slope Angle A (degrees)	Crest Angle B (degrees)	Intersection Angle C (degrees)	Original surface segment length (feet)	Fill Triangle Area (1) (square feet)	Segment Acres	Total Segment Width (feet) (2)	Segment Regrade Volume (cubic feet)	Segment Regrade Volume (cubic yards)
Roads:											
1,500	175	25.0%	14.04	144.46	21.50	138.76	1,472.4	9.27	269.2	2,208,534	81,798
1,000	350	0.0%	0.00	144.46	35.54	175.00	0.0	8.03	350.0	0	0
400	175	25.0%	14.04	144.46	21.50	138.76	1,472.4	2.47	269.2	588,942	21,813
Roads:											
4,400	80	20.0%	11.31	144.46	24.23	56.66	222.2	11.22	111.1	977,778	36,214
2,250	80	0.0%	0.00	144.46	35.54	40.00	0.0	4.13	80.0	0	0
								35.12			**139,824**

(1) The (triangle representing the) fill portion of a road cross-section will be placed back into the cut portion of the road (not shown) to return to original contour. The determination of that area represents the sum of the earthmoving required for that segment.

(2) Roughly approximated by the projection of segment b (the original ground surface) times two sides (the width of the cut half of the road is slightly overstated).



A = atan (original slope)
B = 180 degrees - atan (1.4/1)
C = 180 - A - B

, states that: $\frac{\text{Sin A}}{a}$ $\frac{\text{Sin B}}{b}$ $\frac{\text{Sin C}}{c}$ are all equivalent

Then b = (sin B / Sin C) * c

The law of sines further states that the area of the triangle = 0.5 * cb sin A

CRICKET MOUNTAIN PROJECT - BIG SAGE

SRK Consulting

Miscellaneous

Spreadsheet E

SUMMARY	Structures	Culverts	Maintenance	Monitoring	Conveyors	Stormwater Controls	Waste Removal	TOTAL
Equipment	$11,908	$1,258		$606	$7,180	$8,405		$29,357
Labor	$11,908	$1,004	$3,678	$7,800	$9,789	$1,508		$35,687
Materials			$920			$336	$4,665	$5,921
TOTAL COST	**$23,816**	**$2,263**	**$4,598**	**$8,406**	**$16,969**	**$10,249**	**$4,665**	**$70,965**

A) STRUCTURE DEMOLITION AND DISPOSAL FACILITY	LENGTH	WIDTH	HEIGHT	VOL (CU. FT)	UNIT COST	COST	SOURCE
PIPELINES - water supply (2 inch diameter PVC)	750				$1.74	$1,305	RS Means 2007, 024113-38-1600, Heavy Construction Cost Data, 21st edition.
PIPELINES - water supply (3 inch diameter PVC)	2,000				$1.74	$3,480	RS Means 2007, 024113-38-1600, Heavy Construction Cost Data, 21st edition.
POWERLINES			0.13 miles		$12,500	$1,625	Sierra Pacific Power, 2006
SUBSTATIONS (per unit)			1 substation		$15,000	$15,000	Sierra Pacific Power, 2004
DIESEL FUEL STORAGE	Qty:	1	40,000 gallon capacity		$365	$365	RS Means 2007, 130505-75-0540, Heavy Construction Cost Data, 21st edition.
GASOLINE FUEL STORAGE	Qty:	1	500 gallon capacity		$664	$664	RS Means 2007, 130505-75-0520, Heavy Construction Cost Data, 21st edition.
EXPLOSIVES MAGAZINES	20	8	8	1,280	$0.22	$282	RS Means 2007, 024116-13-0012, Heavy Construction Cost Data, 21st edition.
WATER STORAGE	Qty:	3	20,000 gallon capacity		$365	$1,095	RS Means 2007, 130505-75-0540, Heavy Construction Cost Data, 21st edition.
TOTAL						**$23,816**	*Assumed to be 1/2 equipment and 1/2 labor

B) REVEGETATION MONITORING AND MAINTENANCE

MONITORING

ASSUMES A RANGE SPECIALIST AT $65/HOUR FOR 40 HOURS PER YEAR FOR 3 YEARS: $ 7,800

Truck / travel cost: 400 miles round trip/yr from Salt Lake City for 3 years @$0.505/mile $ 606

MAINTENANCE

PERCENTAGE OF TOTAL VEGETATION AREA REQUIRING REVE(10% *Based on reclamation experience at the Cricket Mountain Mine.

Total Vegetation Acres	Acres to Reveg	Cost Per Acre
483.1	48.3	$95

TOTAL REVEG COST: $4,598

*Assume 20% of maintenance cost is for materials, 80% is for labor. Assume hand-seeding.

C) CULVERTS

CULVERT REMOVAL	No. Culverts	$ equipment/culvert	$ labor/culvert
(2 laborers, 1 operator, 1 CAT 325 Excavator)	4	$314.60	$ 251.07

TOTAL CULVERT COST: $ 2,262.68

Assume 4 hours per culvert based on RS Means Heavy Construction, 2007, removal rates for 36 inch diameter culvert, 024113-40-0180, 21st edition.

D) WASTE REMOVAL

SOLID WASTE

Dumpster Delivery	$65.00	each
Haul	$195.00	each
Dumpster Rent per month	$68.00	each
Disposal Fee per ton	$72.00	each
Off-site Solid Waste Disposal	30	cy
Number of Dumpsters	1	
Months of Dumpster Rental	3	
Number of Off-site Dumpster Loads	1	
Materials Cost	$1,184.00	includes all fees

RS Means 2007 Heavy Construction Cost Data, 024119-23-0910 through 024119-23-0950, 21st edition

*Assumes 30 cy, 10 ton rolloff dumpster used.

HAZARDOUS WASTE

Truck (5,000 gal) ($/hr)	$ 118.80
Waste Oil (gal)	4,000
Haul to nearby facilities (	1
Distance to facilities (mi)	7
Travel Time to facilities (	0.3
Truck Time at Site (hr)	4
Total Truck Time (hr)	4.3
Materials Cost	$ 510.84

RS Means 2007 Heavy Construction Cost Data, 028120-10-3120, 21st edition

*Transport waste oil from site to nearby facilities.

HYDROCARBON CONTAMINATED SOILS (HCS)

HCS disposal fee (cy)	$ 118.80
Amt. of HCS (cy)	25
Materials Cost	$ 2,970.00

RS Means 2007 Heavy Construction Cost Data, 026510-30-1110, 21st edition.

TOTAL MATERIALS COST **$4,664.84**

E) STORMWATER CONTROLS (Spreadsheet E continued)

BERMS		**DIVERSION DITCHES**			
Berm Length (ft)	1,640	Diversion Length (ft)	3,740		
Berm Top Width (ft)	1	Ditch Bottom Width (ft)	2		
Berm Height (ft)	3	Diversion Depth (ft)	2		
Berm Sideslope Angle (_H:1V)	2	Sideslope Angle (_H:1V)	2		
RECONTOUR					
Recontour Material - CAT 325CL Excavator (CY)	1,276		1,662		
Hourly Production (CY/hr)	140.3		140.3		
Recontour Time (hr)	9.1		11.8		
Labor Cost ($)	$269.75		$349.78		
Equipment Cost ($)	$715.72		$928.07		
REVEGETATION					
Revegetation Acres	0.5		0.9		
Revegetation Production Rate (acre/hr)	0.6		0.6		
Revegetation Time (hr)	0.8		1.4		
Material Cost ($)	$46.58		$81.72		
Labor Cost ($)	$13.38		$23.46		
Equipment Cost ($)	$0.00		$0.00		
PONDS		**SWALE**			
Length (ft)	295	Swale Length (ft)	985		
Bottom Width (ft)	283	Swale Bottom Width (ft)	4		
Depth (ft)	6.6	Swale Depth (ft)	2		
Pond Sideslope Angle (_H:1V)	3.0	Sideslope Angle (_H:1V)	2.5		
RECONTOUR		EXCAVATE			
Recontour Material - CAT D10R Dozer (CY)	21,835	CAT 325CL Excavator (CY)	657		
Hourly Production (CY/hr)	991.2	Hourly Production (CY/hr)	140.3		
Recontour Time (hr)	22.0	Excavation Time (hr)	4.7		
Labor Cost ($)	$652.14	Labor Cost ($)	$139.32		
Equipment Cost ($)	$6,391.44	Equipment Cost ($)	$369.66	**Total Material Cost ($)**	$336.23
REVEGETATION				**Total Labor Cost ($)**	$1,507.54
Revegetation Acres	2.2			**Total Equipment Cost ($)**	$8,404.88
Revegetation Production Rate (acre/hr)	0.6			**TOTAL $**	10,248.65
Revegetation Time (hr)	3.6				
Material Cost ($)	$207.93				
Labor Cost ($)	$59.70				
Equipment Cost ($)	$0.00				

F) CONVEYOR REMOVAL (Spreadsheet E continued)

Section	Length	Crane Hours	Rounded Hours
Truck dump to primary pile	460	9.20	10
Primary pile to screening tower	566	11.32	12
Screening tower to secondary crusher	230	4.60	5
Secondary crusher to screening tower	230	4.60	5
Screening tower to coarse pile	440	8.80	9
Screening tower to medium pile	430	8.60	9
Screening tower to fines screener	226	4.52	5
Fines screener to large-fines pile	432	8.64	9
Fines screener to fines pile	202	4.04	5
Coarse pile reclaim	261	5.22	6
Medium pile reclaim	264	5.28	6
Large-fines pile reclaim	261	5.22	6
Total	**4002**	**80.04**	**87.0**

70-ton crane with operator
Crane hours calculated @ 2 hours per 100 ft section, with a minimun of two hours per section
Crane hours rounded up to nearest whole hour
Estimated four laborers to assist with demolition.
Conveyor will have substantial scrap or resale value.
Dismantled conveyors will be removed from site by scrap dealer or purchaser on their trucks.
Conveyor footing removal covered in Spreadsheet F.
Costs are as follows:

Crane	Operator	Laborers x 4
$82.53	$46.27	$66.25

Dismantling Costs	
Labor	$9,789
Equipment	$7,180
Total	$16,969

CRICKET MOUNTAIN PROJECT - BIG SAGE

SRK Consulting

Concrete Foundation Demolition

Spreadsheet F

Foundation Number	Foundation Name	Foundation Type *	Estimated Volume (CY)	Estimated unit demo cost		Extended est'd cost		TOTAL ($)
				labor ($/CY)	equipment ($/CY)	labor ($)	equipment ($)	
1	Maintenance shop complex and warehouse	SOG	450	0.80	7.09	$361	$3,189	$3,550
2	ANFO Storage	SOG	45	0.80	7.09	$36	$319	$355
3	Truck Wash Pad	SOG	70	0.80	7.09	$56	$496	$552
Footings								
1	Primary Crusher	FTG	250	0.80	7.09	$201	$1,772	$1,972
2	Screen Tower	FTG	35	0.80	7.09	$28	$248	$276
3	Fines Screen Tower	FTG	10	0.80	7.09	$8	$71	$79
4	Secondary Crusher Tower	FTG	35	0.80	7.09	$28	$248	$276
5	Fuel Tank	FTG	20	0.80	7.09	$16	$142	$158
6	Water Tanks	FTG	4	0.80	7.09	$3	$30	$33
7	Conveyor Bends	FTG	400	0.80	7.09	$321	$2,835	$3,155
8	Misc. Items	FTG	75	0.80	7.09	$60	$531	$592
	TOTALS		1,394			$1,118	$9,880	$10,998

Notes:

Concrete volumes were provided by the engineering firm designing the facilities and are subject to change.

Concrete demolition costs were calculated on the Productivity spreadsheet.

Rubblize concrete only. (Then, later, bury rubble under appx. 2' of topsoil and/or fines - see Spreadsheet B - Yards and Stockpiles)

* Foundation type abbreviations: SOG=slab on grade; FTG= footing; WALL= retaining wall

All foundations assumed to have reinforcing steel in the form of reinforcing bars.

Equipment: 1 Cat 385 hydraulic excavator with an 11,000 ft-lb hydraulic impact hammer. Estimated productivity: 73.9 cy/hr.

D10T used to knock down columns and retaining walls for burial.

CRICKET MOUNTAIN PROJECT - BIG SAGE

Building Demolition and Disposal

Spreadsheet G

SUMMARY	
Equipment	$60,480
Labor	$50,400
Materials	$0
TOTAL COST	**$110,880**

Building Number	Building Name	Length (ft)	Width (ft)	Plan View Area (sq. ft.)	Height (ft)	Volume (cu. ft.)
1	Maintenance Shop Comp	100	72	7,200	50	360,000
2	Warehouse	60	60	3,600	20	72,000
3	ANFO Storage	60	60	3,600	20	72,000
	TOTAL			14,400		504,000

Building Number	Building Name	Means Unit Demo Cost labor ($/cf)	Means Unit Demo Cost equipment ($/cf)	Extended Demo Cost labor ($)	Extended Demo Cost equipment ($)	**Total Demo & Disposal Costs ($)**
1	Maintenance Shop Comp	0.10	0.12	$36,000	$43,200	**$79,200**
2	Warehouse	0.10	0.12	$7,200	$8,640	**$15,840**
3	ANFO Storage	0.10	0.12	$7,200	$8,640	**$15,840**
	TOTAL		$0	$50,400	$60,480	**$110,880**

Note: Source of unit costs: RS Means Heavy Construction Cost Data 2007, 024116-13-0012, Structure Demolition, Building Demolition, 21st edition, includes overhead and profit and haulage from site.